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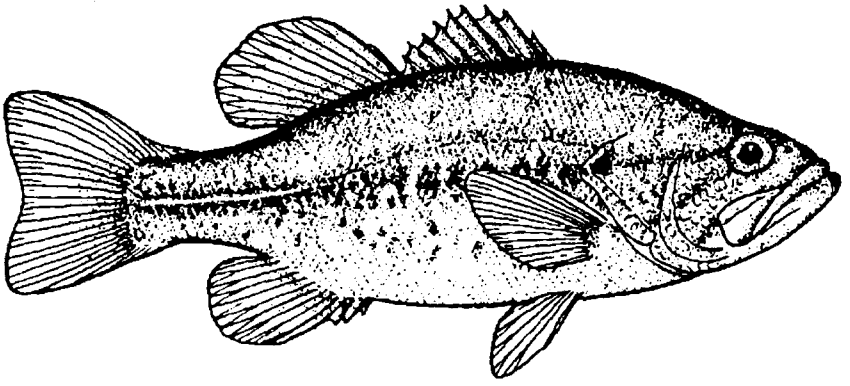
ILLINOIS NATURAL HISTORY SURVEY

Mark and Recapture Studies and Angling Impacts on Largemouth Bass in La Grange and Peoria Reaches of the Illinois River



Center for Aquatic Ecology

**Paul T. Raibley, Timothy M. O'Hara,
Kevin S. Irons, K. Douglas Blodgett
and Richard E. Sparks**

Illinois Natural History Survey

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Paul T. Raibley, Timothy M. O'Hara, Kevin S. Irons, K. Douglas Blodgett

Illinois Natural History Survey
LTRMP La Grange Field Station
704 N. Schrader Ave.
Havana, IL 62644

and Richard E. Sparks

Illinois Natural History Survey
Forbes Biological Station
P.O. Box 590
Havana, IL 62644

May 1996

Richard E. Sparks
Dr. Richard E. Sparks, Principal Investigator
Illinois Natural History Survey
Center for Aquatic Ecology

K. Douglas Blodgett
K. Douglas Blodgett, Co-Investigator
Illinois Natural History Survey
Center for Aquatic Ecology

Paul T. Raibley
Paul T. Raibley, Co-Investigator
Illinois Natural History Survey
Center for Aquatic Ecology

Dr. David P. Philipp
Illinois Natural History Survey
Center for Aquatic Ecology

Executive Summary

In the late 1800s, largemouth bass were so abundant in the Illinois River that they were harvested commercially. Largemouth bass and many other fish species declined in abundance throughout the 20th century largely because humans drastically altered the riverine environment. During the early 1990s we noticed an apparent resurgence in largemouth bass numbers in La Grange Reach of the Illinois River; this was accompanied by an increase in the number of bass tournaments.

In 1992 we began to study Illinois River largemouth bass in detail, tracking changes in population structure and examining movement patterns and harvest rates to determine the status of the bass fishery. From 1992 through 1994 we tagged and released 4,507 individual largemouth bass ≥ (greater than or equal to) 9 inches (230 millimeters) long in the La Grange and Peoria Reaches of the Illinois River and estimated movements of those that were recaptured and reported. From 1992 through 1995, 652 different anglers caught 1,162 (24.9%) of the bass we tagged. Of those, about 5.9% were kept (harvested) by non-tournament anglers, probably a rather conservative estimate of angling harvest.

Of the 1,473 bass for which we had the location of recapture, 985 (66.9%) were recaptured within 1 mile (1.6 kilometers) of their release location, indicating tagged bass usually stayed in the area where they were released. We summarized general movement patterns of tagged bass released in specific areas; bass seemed to find more favorable habitat in certain areas than in others. Fish released along the main channel were more likely to move than those released in backwaters or sloughs, and bass translocated by tournament anglers and released by us were more likely to move than those released in their home areas after our electrofishing sampling. The longest a tagged bass was at large was three years, nine months, and four bass were transplanted by anglers from the river into other local bodies of water.

We calculated a population estimate of 1,684 largemouth bass in a 2.5-mile (4 kilometer) stretch of a backwater slough (Snicarte Slough), and bass densities were comparable to those documented on Mississippi River backwaters in the late-1980s when fishing there was considered high quality. We documented 106 tournaments on the La Grange and Peoria Reaches from 1992 to 1995, where anglers brought in 6,793 bass weighing 11,544 pounds (5,247 kilograms) with an average weight of 1.7 pounds (0.8 kilograms). The two years with the most tournaments were 1994 (43) and 1995 (42). Catch rates of tournament anglers were highest in 1994 (1.85 fish/angler/day) and lowest in 1993 (0.88 fish/angler/day); high 1994 catch rates coincided with low, stable river levels, while low 1993 catch rates coincided with flood conditions.

Tournament anglers commonly employ a centralized weigh-in location format which results in bass being removed from their home area and translocated to the weigh-in site where they are generally released at a boat ramp, marina or nearby backwater. This format can be stressful to the fish, and we recommend the frequency of its use be reduced in favor of a "bump and run" or "weigh and run" format where fish are measured and/or weighed and released in the

same area where they are caught. Although no length limit is currently in effect for Illinois River largemouth bass, we believe a 12 inch (305 millimeter) minimum length limit for both largemouth and smallmouth bass would give them an opportunity to spawn at least once before being subjected to harvest and would draw attention to the need for conservation of this resource. Perhaps the most effective strategy for managing any Illinois River fish species is to work toward increasing available spawning, nursery and wintering habitats.

Introduction

In the late 1800s, largemouth bass were so abundant in the Illinois River system that they were harvested commercially with a reported harvest of 69,991 pounds (lbs) or 31,814 kilograms (kg) in 1894 (Smith 1898). Since then, humans have drastically altered the Illinois River. The diversion of sewage-laden water from Lake Michigan via the Chicago Sanitary and Ship Canal beginning in 1900, industrial pollution, leveeing and draining of backwaters for agriculture, development in the drainage basin, and the operation of locks and dams to maintain a commercial navigation channel have all impacted Illinois River biota (Kofoid 1903, Mulvihill and Cornish 1929, Mills et al. 1966). Prior to 1900, the Illinois River contained approximately 55,662 acres or 22,526 hectares (ha) of ponds, sloughs, lakes and marshes (Bellrose et al. 1983). The area in these waters doubled to approximately 111,323 acres (45,052 ha) with the diversion of water from Lake Michigan in 1900, which temporarily increased fish production; diversion rates increased steadily through 1920 before being curtailed. From 1933 to 1939 the river was impounded by a series of navigation dams which increased the total water surface area only slightly because diversions from Lake Michigan were greatly reduced during this period (Bellrose et al. 1983). The slight increase in water surface area did, however, significantly increase backwater acreage as marshes were flooded.

In its natural state the Illinois River had 545,824 acres (220,892 ha) of floodplain susceptible to natural river overflows (Landsat Thematic Mapper Satellite data 1989), but leveeing and draining have reduced that figure by 64% to 195,293 acres (79,034 ha). Furthermore, backwater depth and area have been greatly reduced because of siltation and leveeing (Bellrose et al. 1983). The net result of these alterations was a decline in many Illinois River fish populations.

Mills et al. (1966) attributed declines in largemouth bass and other Illinois River fish populations throughout the 20th century to pollution and habitat loss and noted that sportfishing for largemouth bass was rare in the 1960s, except in a few backwater lakes. Although anglers were not fishing for them, largemouth bass were commonly collected in the Illinois River in the 1960s and 1970s (Sparks and Starrett 1975). The fishery remained largely unexploited until the late 1980s when anglers began holding tournaments on the river. The fishery has become extremely popular with both tournament (fishing or prefishing for tournament events) and non-tournament anglers throughout the 1990s. We are unsure exactly when and why largemouth bass numbers increased, but we suspect they responded to a combination of improved water quality, favorable hydrological regimes and low fishing pressure. Lerczak and Sparks (1995) attributed the dramatic resurgence in centrarchid populations in the

reaches above Starved Rock in the 1980s to water quality improvements.

We tagged and released largemouth bass in La Grange and Peoria Reaches of the Illinois River from 1992 to 1994 and obtained information on movements, population densities and harvest rates for bass recaptured from 1992 to 1995. Our objective was to use this information, along with data we have gathered on largemouth bass population dynamics, to determine the status of the fishery in La Grange and Peoria Reaches. As of 1996, the only management regulation in effect for Illinois River largemouth bass was a six-fish creel limit; we hoped to determine if additional management strategies might help sustain or enhance Illinois River largemouth bass populations in the future.

Study Area

River charts and channel markers used by the U.S. Army Corps of Engineers (USACOE) indicate Illinois River distances by river mile (RM), beginning at its confluence with the Mississippi River (RM 0) and extending to its origin at the confluence of the Des Plaines and Kankakee Rivers (RM 273). The La Grange Reach of the Illinois River (Figure 1) is a 78-mile, 126-kilometer (km) segment marked at the downstream end by the La Grange Lock and Dam (RM 80) and at the upstream end by the Peoria Lock and Dam (RM 158). Leveeing and draining (from 1909 to 1922) have reduced the area of the floodplain of La Grange Reach by 45% from 201,168 acres (81,411 ha) to 111,147 acres (44,981 ha). The modern floodplain of La Grange Reach (that part which has not been leveed and drained) contains approximately 57% of the river's total floodplain area and 36% (16,185 acres, 6,550 ha) of its existing backwater area (Havera 1992).

The Peoria Reach is a 73-mile (117 km) segment marked at the downstream end by the Peoria Lock and Dam (RM 158) and at the upstream end by the Starved Rock Lock and Dam (RM 231). Leveeing and draining (from 1902 to 1922) have reduced the area of the floodplain of Peoria Reach by 56% from 91,825 acres (37,161 ha) to 39,983 acres (16,181 ha). The modern floodplain of Peoria Reach contains approximately 21% of the river's total floodplain area and 36% (16,339 acres, 6,612 ha) of its existing backwater area.

Combined, these two reaches contain 55% of the Illinois River's length, 78% of its modern floodplain area and 72% of its existing backwater area. Although La Grange and Peoria Reaches possess nearly equal amounts of backwater surface area, La Grange Reach, with its myriad of backwater lakes, probably contains a greater amount of suitable backwater habitat for largemouth bass than Peoria Reach. Approximately 85% of the backwater acreage in the Peoria Reach is in Peoria Lake, a 13,878 acre (5,616 ha) lake that is mostly shallow and silty. Peoria Lake's expansive, shallow, open water areas offer little cover for largemouth bass, but cover does exist along the shoreline and in numerous marinas and ditches.

Methods

Largemouth bass tagged and released were $\geq$ (greater than or equal to) 9 inches (") or 230 millimeters (mm) long and were collected during our electrofishing sampling or obtained at bass tournament weigh-ins. Tagged fish were predominantly recaptured during our electrofishing sampling or by

Figure 1. La Grange and Peoria Reaches of the Illinois River.

tournament and non-tournament anglers. We used individually numbered FD-67B anchor tags (manufactured by Floy Tag & Mfg., Inc., Seattle, WA) and implemented a reward system as an incentive for anglers to notify us when they caught tagged bass; "Reward" was printed on each tag. In December of each year (1992-1995) we randomly selected winners of cash and prizes from a pool of all anglers who reported tagged bass; each recapture was worth one entry in the drawing. Cash prizes were $100, $50 and $25 each year. We contacted each angler verbally or in writing to thank them for their cooperation and to give them information on the tagged bass they caught. We also surveyed each angler that reported a tagged bass to gather information such as tournament affiliation, target species, harvest rates, etc.

On June 14, 1994, we began a study to estimate the numbers and standing stock of largemouth bass in an Illinois River backwater slough. We used two electrofishing rigs and shocked both sides of a 2.5-mile (4 km) segment of Snicarte Slough (Figure 2) on each of four consecutive days. Snicarte Slough is approximately 7 miles (11.3 km) long, so we were able to sample approximately 36% of its length in one day. We electrofished the area in 30-minute segments, measuring, weighing, marking and releasing bass after each segment was completed. We hole punched the caudal fin of all bass and floy tagged each bass $\geq$ 9" (230 mm) long. The section of slough electrofished was approximately 128 feet (ft) or 39 meters (m) wide, 38.8 acres (15.7 ha) in area and had a maximum depth of about 3 ft (0.9 m). Water temperatures ranged from 81°F to 86°F (27°C to 30°C) and dissolved oxygen from 4 to 6 parts per million. River levels were stable throughout the four-day period. We electrofished adjacent to the study area in Bath Chute and Snicarte Slough to look for bass movement out of the study area. Population estimates were calculated using the Schumacher/Eschmeyer method (Ricker 1975) and were used to estimate bass densities (standing stocks).

Results and Discussion

Mark and Recapture Information

From 1992 through 1994 we floy tagged and released 4,507 individual largemouth bass $\geq$ 9" (230 mm) long in the La Grange and Peoria Reaches of the Illinois River. We received recapture information from approximately 652 different anglers from 1992 through 1995. When we encountered bass which were missing their original tag, we retagged them before they were released again. This resulted in a total of 4,666 floy tagged fish from which we could receive recapture information: 2,756 from Illinois River bass tournaments and 1,910 from our fisheries sampling (mostly electrofishing). We documented 1,673 recaptures of floy-tagged bass from four main sources: (1) 698 from non-tournament anglers, (2) 557 from tournament anglers, (3) 410 from our fisheries sampling, and (4) 8 from commercial fishermen. Two tags were found by people who were not fishing, one tag was in a filleted bass carcass in a park garbage can and another was in the stomach of a snapping turtle. Of the anglers who returned tags, 59.5% were fishing for largemouth bass, 16.9% for white bass, 5.2% for crappie and 4.5% for channel catfish; these four species represented 86.2% of the species sought by anglers and 10.4% indicated they were fishing for anything that would bite.

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or marina along the main channel, and released either there or in other nearby areas. If anglers failed to notify us they caught and transported a tagged bass, we would have no way of knowing the fish had been moved away from its last known location. From our conversations with local tournament anglers, we realized this was a common occurrence and may affect movement results.

A summary of recapture information from 4,882 records of bass tagged and released (after tournaments and electrofishing) at specific locations in La Grange and Peoria Reaches is listed in Table 1. Locations are listed from upstream to downstream and are grouped by general area (e.g., Chillicothe Area, Peoria Lake Area, Peoria Tailwaters, etc.). Maps showing locations where we tagged and released largemouth bass in La Grange Reach are presented in Appendix A, but we did not include similar maps for the Peoria Reach. The number of tagged bass recaptured is not an indication of angler success because it includes recaptures from our electrofishing sampling. Table 1 can be used to determine where fish were recaptured after being released at a specific location and the number of fish released and recaptured at specific locations. For example, of the 72 bass we tagged and released in the East River near Chillicothe (first line in Table 1), 11 (15.3%) were recaptured. We knew the location of capture for 10 and of those, 30% were caught at the same location (East River) and 70% were caught in the general Chillicothe area. This indicates tagged bass stayed in the East River and the general Chillicothe area after being released, although it is based upon only 10 recaptured fish. When the number of recaptures with location information is large, it is more likely that the observed trend is real than when the number is small. For example, we had 60 recaptures with location information from the 169 bass we released at the Peoria Tailwaters; 83.3% (50) were recaptured at the same location, so we believe the tendency for fish released there to stay in the area is real, perhaps because the dam is a barrier to upstream movement or because bass have abundant forage there. Other locations with high percentages in the "Same Location" column were areas where bass generally remained after they were released, possibly because their living requirements were met in these areas. Some examples include Peoria Casting Club (75.0%), Pekin Boat Club (61.9%), Crystal Lake (60.7%), Upper Powerton Ditch (57.4%), Quiver Lake (81.2%), Coal Dock Cove (75.0%), Havana main channel border (59.4%), Upper Bath Chute (80.6%), Patterson Bay (77.8%), Treadway Lake (62.5%), Muscooten Bay (80.0%) and Lily Lake (82.6%).

Of the fish released along the main channel border at Pekin CILCO that were recaptured, only 15.5% were captured at that location, while 35.7% and 23.8% were caught downstream near Pekin and in the Powerton area ditches respectively. This demonstrates the tendency of fish released along the main channel to move downstream. However, tagged bass were more likely to remain at some main channel border locations with rip-rap banks and/or slack water areas such as the Pekin Boat Club (61.9%), Pekin (33.9%) and Havana (59.4%).

Other significant movement patterns of tagged bass evident in Table 1 included Pekin Lake to the Pekin Area channel border (42.2%), Pekin Railroad Bridge to the Powerton Area ditches (66.7%), Lower Powerton Ditch to Upper Powerton Ditch, Crystal Lake or the Little Mackinaw River

Table 1. Recapture information for fish released at specific locations in La Grange and Peoria Reaches of the Illinois River.
Total number of fish released, recaptured and with location information, and percent recaptured by area and location.
General locations listed from upstream to downstream. Largemouth bass were tagged and released in other locations, but in fewer numbers.

Chillicothe Area

Site No.	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Chillicothe Area*	Totals
1	East River	72	11 (15.3%)	10	30.0%	70.0%	100.0%
2	Peoria Casting Club	35	16 (45.7%)	16	75.0%	25.0%	100.0%
3	Chillicothe	34	12 (35.3%)	12	41.7%	41.7%	83.3%
	Totals	141	39 (27.7%)	38	52.6%	42.1%	94.7%

Peoria Lake Area

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Peoria Lake Area	Totals	Peoria Other	La Grange Other
4	Peoria Lake	258	56 (21.7%)	51	54.9%	15.7%	70.6%	19.6%	9.8%

Peoria Tailwaters

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Pekin Cilco*	Pekin*	Powerton Area	Totals	Other
5	Peoria Tailwaters	169	61 (36.1%)	60	83.3%	1.7%	3.4%	3.4%	91.7%	8.3%

Pekin Area

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Peoria Tailwaters	Pekin*	Powerton Area	Totals	Other
6	Pekin Cilco*	352	85 (24.1%)	84	15.5%	11.9%	35.7%	23.8%	86.9%	13.1%
7	Pekin Lake	143	48 (33.6%)	45	2.2%	13.3%	42.2%	28.9%	86.7%	13.3%
8	Pekin Boat Club*	93	21 (22.6%)	21	61.9%	0.0%	23.8%	4.8%	90.5%	9.5%
9	Pekin*	195	64 (32.8%)	62	33.9%	1.6%	6.5%	43.5%	85.5%	14.5%
10	Pekin RR Bridge*	64	21 (32.8%)	21	9.5%	4.8%	19.0%	66.7%	100.0%	0.0%
11	Crystal Lake	161	57 (35.4%)	56	60.7%	1.8%	14.3%	14.3%	91.1%	8.9%
12	Upper Powerton Ditch	173	65 (37.6%)	61	57.4%	3.3%	6.6%	16.4%	83.6%	16.4%
13	Lower Powerton Ditch	84	29 (34.5%)	29	34.5%	0.0%	10.3%	44.8%	89.7%	10.3%
14	Little Mackinaw River	79	22 (27.8%)	21	38.1%	0.0%	14.3%	38.1%	90.5%	9.5%
15	Turkey Island	41	16 (39.0%)	16	25.0%	0.0%	18.8%	12.5%	56.3%	43.8%
	Totals	1385	428 (30.9%)	416	33.9%	5.0%	20.0%	27.9%	86.8%	13.2%

Table 1 (Continued)

Havana Area

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Quiver Lake	Towhead Island	Coal Dock Cove	Havana Marina	Havana*	Matanzas Lake	Totals	Other
16	Quiver Lake	389	102 (26.2%)	101	81.2%	----	3.0%	4.0%	1.0%	1.0%	0.0%	90.1%	9.9%
17	Towhead Island	149	44 (29.5%)	41	43.9%	29.3%	----	14.6%	4.9%	2.4%	0.0%	95.1%	4.9%
18	Coal Dock Cove	196	75 (38.3%)	72	75.0%	4.2%	4.2%	----	8.3%	0.0%	1.4%	93.1%	6.9%
19	Havana Marina	139	53 (38.1%)	52	38.5%	7.7%	1.9%	36.5%	----	5.8%	1.9%	92.3%	7.7%
20	Havana*	406	108 (26.6%)	106	59.4%	2.8%	1.9%	13.2%	4.7%	----	5.7%	87.7%	12.3%
	Totals	1279	382 (29.9%)	372	63.7%	28.0%	7.3%	26.1%	9.1%	18.3%	2.2%	90.9%	9.1%

Bath Chute Area

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Upper Bath Chute	Middle Bath Chute	Lower Bath Chute	Grand Island*	Snicarte Slough	Patterson Bay	Totals	Other
21	Upper Bath Chute	129	32 (24.8%)	31	80.6%	----	0.0%	9.7%	3.2%	0.0%	0.0%	93.5%	6.5%
22	Middle Bath Chute	19	4 (21.2%)	3	33.3%	0.0%	----	0.0%	0.0%	33.3%	0.0%	66.7%	33.3%
23	Lower Bath Chute	87	13 (14.9%)	13	53.8%	7.7%	0.0%	----	7.7%	7.7%	7.7%	84.6%	15.4%
24	Patterson Bay	90	29 (32.2%)	27	77.8%	3.7%	0.0%	0.0%	0.0%	18.5%	----	100.0%	0.0%
25	Snicarte Slough	593	120 (20.2%)	116	57.8%	3.4%	6.0%	2.6%	0.9%	----	7.8%	78.4%	21.6%
	Totals	918	198 (21.6%)	190	63.7%	16.3%	4.2%	6.8%	1.6%	38.9%	16.3%	84.2%	15.8%

Sanganois/Sangamon Area

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Panther Slough	Chain Lake	Knapps Island	Crane Lake	Browning*	Sanganois Area	Bach Slough	Treadway Lake	Wood Slough	Muscooten Bay	Totals	Other
26	Panther Slough	130	9 (6.9%)	9	11.1%	----	22.2%	11.1%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	55.6%	44.4%
27	Chain Lake	110	11 (10.0%)	10	0.0%	40.0%	----	10.0%	10.0%	10.0%	0.0%	0.0%	10.0%	0.0%	0.0%	80.0%	20.0%
28	Knapps Island	20	5 (25.0%)	5	60.0%	0.0%	20.0%	----	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%	20.0%
29	Bach Slough	125	21 (16.8%)	20	30.0%	0.0%	0.0%	0.0%	10.0%	25.0%	5.0%	----	5.0%	5.0%	0.0%	80.0%	20.0%
30	Wood Slough	70	11 (15.7%)	10	10.0%	0.0%	0.0%	10.0%	0.0%	0.0%	0.0%	0.0%	50.0%	----	0.0%	70.0%	30.0%
31	Treadway Lake	50	9 (18.0%)	8	62.5%	0.0%	12.5%	0.0%	0.0%	0.0%	12.5%	12.5%	----	0.0%	0.0%	100.0%	0.0%
32	Muscooten Bay	31	5 (16.1%)	5	80.0%	0.0%	0.0%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%	100.0%	0.0%
	Totals	536	71 (13.2%)	67	29.9%	7.5%	6.0%	10.4%	6.0%	9.0%	3.0%	10.4%	17.9%	3.0%	6.0%	79.1%	20.9%

Lilly Lake

	Release Location	Number Released	Number (%) Recaptured	Number With Locations	Same Location	Muscooten Bay	La Moine River	Other
33	Lily Lake	196	49 (25.0%)	46	82.6%	6.5%	2.2%	8.7%

	All Areas	**4882**	**1284(26.3%)**	**1,240**

* Main Channel Border Areas

(Powerton Area, 44.8%), and the Havana Marina to the Coal Dock Cove (36.5%). Table 1 also indicates general home areas or ranges for fish released in specific locations. For example, fish we tagged and released in the Havana Marina were recaptured in five other locations, from Quiver Lake down to Matanzas Lake, indicating largemouth bass may use habitats associated with this entire 7-mile (11.3 km) segment of river at some time during their lives.

Other interesting facts from the mark/recapture study included: (1) The longest period a tagged bass was at large before being recaptured was 1,367 days (3 years, 9 months), having been released in 1992 and recaptured in 1996, (2) Eight fish tagged and released in 1992 were recaptured in 1995, (3) twenty-one bass were recaptured in a reach other than the one in which they were released (i.e. moved or were translocated through a lock and dam), (4) four tagged bass were transplanted from the Illinois River to other local bodies of water (the initial recaptures were not reported) where they were recaptured by other anglers (two at Spring Lake near Manito, IL, one at a stripmine lake near Canton, IL and one at Lake Arlan near Pekin, IL), (5) one bass was caught by an angler just hours after we had tagged and released it while electrofishing and (6) anglers caught 33 bass the day after we released them; 23 had been released after tournaments and 10 had been released after electrofishing.

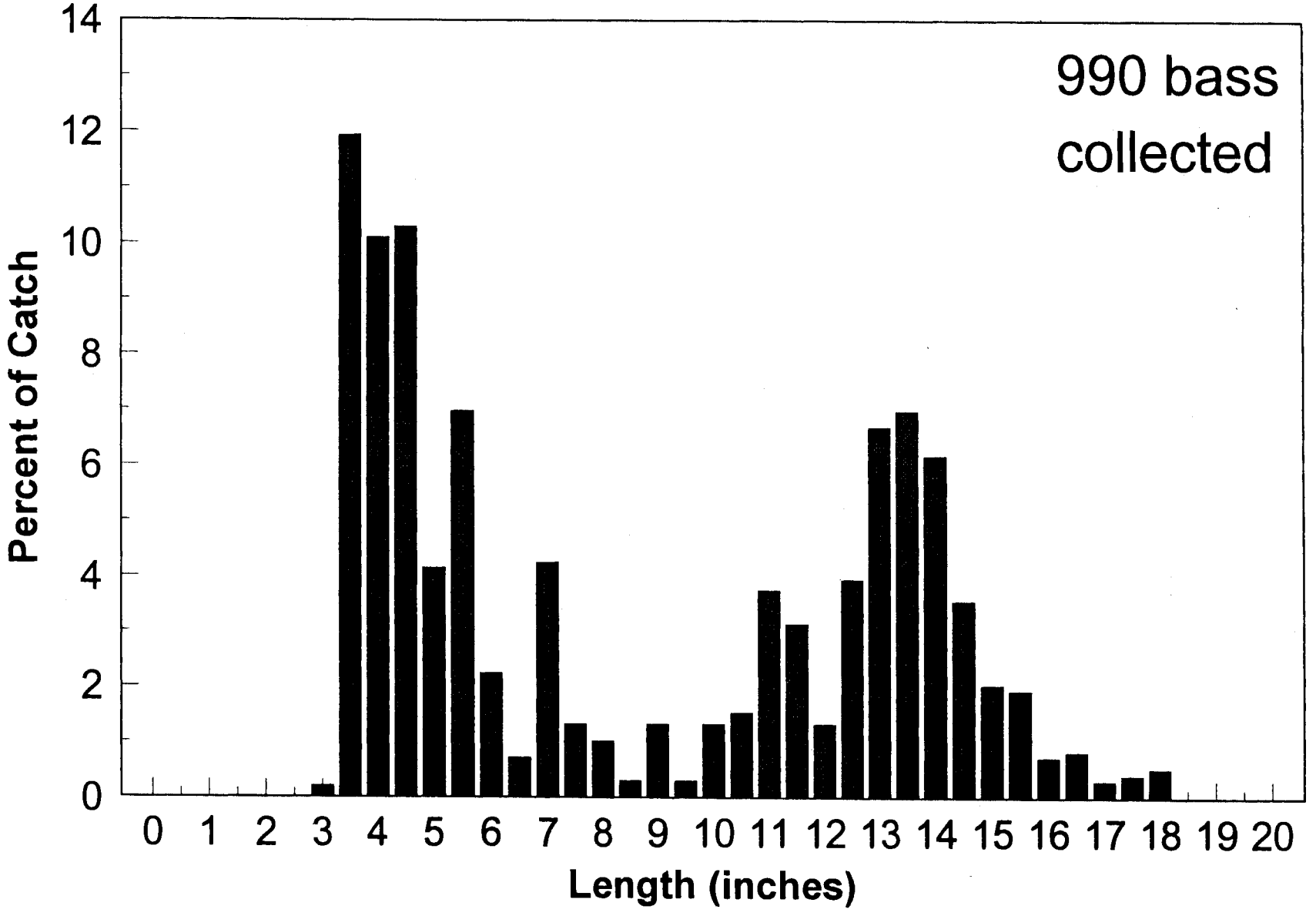
Population/Standing Stock Estimation in Snicarte Slough in 1994

Population estimates for any reach of a large river-floodplain system are difficult to obtain. When such a large and complex study area is of interest, mark and recapture studies are inadequate because we cannot sample all areas in the reach. Mark and recapture studies designed to calculate the population within a given area (e.g., a backwater lake) are complicated by fish moving into and out of the study area. These movements increase or decrease the ratio of marked/unmarked fish in the study area, and the longer the time frame over which the estimate is calculated, the higher the probability that fish moved into or out of the study area. Because of these movements, estimates made over an extended period of time (e.g., an entire sampling season) are inaccurate. By restricting the study to a small time period (four days) when river levels were stable, we hoped to minimize fish movement into and out of the study area. Because we caught no marked fish outside the study area, we felt movement into and out of the study area was negligible.

During the four days of the study, we collected 990 largemouth bass in 2,099 minutes of electrofishing in the study area. Figure 3 is the length distribution of the fish we collected, indicating the percent of our catch in each half-inch length group. This distribution illustrates the length composition of the largemouth bass in Snicarte Slough in 1994. Many of the fish were 3-8" (80-200 mm) long and were produced during 1993, but there were also many adult fish longer than 12" (305 mm); the 13-14" (330-355 mm) fish were produced in 1990. The largest bass we collected during the population study was just over 18" long. For further information on largemouth population structure in La Grange Reach, see Raibley et al. (in preparation).

Based upon the proportion of marked fish we recaptured each day, we calculated a

Figure 3. Length distribution of largemouth bass in the Snicarte Slough Study Area (June 14-17, 1994).



population estimate of 1,684 largemouth bass (of all sizes) in the study area (Table 2). We assumed the study area was representative of the rest of the slough and projected an estimate of 4,677 bass in the entire 7 miles (11.3 km) of slough. Estimates of bass $\geq$ 9" (230 mm) and $\geq$ 12" (305 mm) long in the study area were 517 and 383, respectively, or 1,447 and 1,072 for the entire slough. Estimated standing stocks for all bass, bass $\geq$ 9" (230 mm), and bass $\geq$ 12" (305 mm) were 43, 13 and 10 bass/acre, respectively (Table 3). These estimates apply only to Snicarte Slough which during our study probably contained higher densities of largemouth bass than most other areas in the Illinois River. These estimates are significant because they are the first we know of for Illinois River largemouth bass populations and provide a measure of bass density and abundance which can be compared to those from other populations. In 1994 the bass standing stock ($\geq$ 9") in Snicarte Slough was comparable to those in upper Mississippi River backwaters in the late 1980s (Pitlo 1992) when the upper Mississippi River was considered a high quality largemouth bass fishery. The winner of the 1994 BASSMASTERS SuperStars Tournament, along with several other top finishers, caught the majority of their fish in Snicarte Slough just three days prior to our study. Because Snicarte Slough usually holds large numbers of bass, it is heavily fished by both tournament and non-tournament anglers and probably received even more pressure after being publicized on the BASSMASTERS television program.

Of the 302 bass we floy tagged and released in the Snicarte Slough study area, 75 (24.8%) were recaptured by anglers in 1994 and 1995 (Table 4). Tournament anglers recaptured 13.9% of those, while 10.9% were recaptured by non-tournament anglers for a combined 24.8% by all anglers. This value was remarkably similar to the 24.9% recapture rate for all bass we tagged from 1992 to 1994. Of the 33 bass recaptured by non-tournament anglers, 16 (48.5%) were harvested. With a recapture rate of 10.9% by non-tournament anglers and a harvest rate of 48.5%, only about 5.3% of the bass we tagged were harvested (similar to our previous estimate of 5.9%). Another 5.6% of fish caught by tournament anglers were relocated to another area after being weighed-in. So approximately 10.9% of the bass we tagged were removed from Snicarte Slough and were either harvested by non-tournament anglers or translocated by tournament anglers. Of the tagged bass anglers caught, 55% were caught in Snicarte Slough, while 45% were caught in other areas.

Recapture data indicated that at some point after their release, many tagged bass from Snicarte Slough moved into contiguous areas such as Patterson Bay, Bath Chute and the Sanganois Conservation Area. Recapture data also indicated largemouth bass movements in Snicarte Slough and many other areas seemed to be related to river levels. For example, a largemouth bass in Snicarte Slough may move into Patterson Bay or onto the floodplain in the Sanganois area when river levels are rising. When river levels recede and drain the floodplain and backwaters these fish may return to Snicarte Slough and move out into Bath Chute or along the main channel. Bass we collected in Snicarte Slough may use different locations within the entire area depicted in Figure 2, because abundant backwaters, sloughs and floodplain provide habitat diversity for largemouth bass to utilize at various times during the year. This

Table 2. Population estimates for largemouth bass in the Snicarte Slough study area.

Size Group	Population Estimate
All	1,684
> 9"	517
> 12"	383

Table 3. Standing stock estimates for the Snicarte Slough study area and those from a study of Mississippi River backwaters.

Study Area	Size Group	Standing Stock bass/acre
Snicarte Slough	All	41
Snicarte Slough	> 9"	13
Snicarte Slough	> 12"	10
Minnesota Slough*	> 9"	7.4
Norwegian Slough*	> 9"	10.9
Methodist Slough*	> 9"	14.2
Sunfish Slough*	> 9"	20.5
Lainesville/Browns*	> 9"	15.7

* John Pitlo, Iowa DNR (1992), averages for 1987-1991

Table 4. Recaptures of bass tagged during the Snicarte Slough population study.

Number Tagged	Caught by Leisurely Anglers	Caught by Pretournament Anglers	Caught by Tournament Anglers	Total Caught
302	33* (10.9%)	25 (8.3%)	17 (5.6%)	75 (24.8%)

* 16 (48.5%) Harvested

abundant and diverse habitat may help maintain large numbers of bass here when they are less abundant in other areas of La Grange Reach where spawning, nursery and wintering habitat may be more limited.

Tournaments and the Fishery

Although no length limit is currently in effect on the Illinois River, most bass tournament anglers have adopted a voluntary 12" (305 mm) minimum length limit for their events. In 1992 we attended eight tournaments on La Grange and Peoria Reaches to obtain largemouth bass for tagging. At those eight tournaments anglers caught 576 bass weighing 873.6 lbs (397 kg) for an average weight of 1.52 lbs (0.7 kg) per bass (Table 5). Other tournaments were held in 1992 but we did not document them. From 1993 to 1995 we attempted to document all tournaments held on La Grange and Peoria Reaches of the river. We documented only 13 tournaments in 1993 because high river levels caused the cancellation of many of the scheduled tournaments. We documented 43 tournaments in 1994 and 42 in 1995. At the 98 tournaments from 1993 to 1995, 4,463 anglers caught 6,217 bass for an average of 1.34 fish/angler/day (an average angling day was approximately 8 hours long). The average bass caught during these tournaments weighed 1.71 lbs (0.8 kg). In the 106 tournaments we have documented from 1992 to 1995, anglers caught 6,793 bass weighing 11,544 lbs (5,247 kg) with an average weight of 1.70 lbs (0.8 kg). The average weight of bass caught increased each year to a high of 1.86 lbs (0.9 kg) in 1995.

Angler catch rates were lowest during 1993 (0.88 fish/angler/day) and highest in 1994 (1.85 fish/angler/day); low 1993 catch rates coincided with flood conditions, while high 1994 catch rates coincided with low, stable river levels. Our analysis of bass population structure (Raibley et al. in preparation) indicated more fish > 12" (305 mm) long were present in La Grange Reach in 1994 than in other years, which may also help explain higher 1994 catch rates. Appendix B lists dates, sponsors, locations and catch statistics for all tournaments we documented in the La Grange and Peoria Reaches from 1992 to 1995.

One tournament of particular interest held on the Illinois River was the BASSMASTERS SuperStars tournament. In this tournament 30 of the world's greatest professional bass anglers (SuperStars) fished La Grange and Peoria Reaches of the Illinois River for three days in early June of 1993, 1994 and 1995 (see shaded rows in tables of Appendix B). Flood conditions prevailed in 1993 and 1995, so catch rates were lower in those years (2.25 and 2.73 fish/angler/day, respectively) than in 1994 (3.29 fish/angler/day) when river levels were low and bass densities were high. Catch rates for 1993 would have been even lower (than our calculated value) relative to those from 1994 and 1995 because participants were allowed to weigh six fish per day in 1993, but only five in 1994 and 1995. SuperStars catch rates were higher than the averages we calculated for all tournaments combined in each year (Table 5) and in 1993 and 1995 were higher than those from any other single tournament. In 1994 a tournament held on July 24 had a catch rate of 4.00 fish/angler/day, which was the highest recorded to date, but only nine anglers participated catching 36 fish. Relatively higher SuperStar catch rates are an indication that they truly are great anglers, particularly when we consider that unlike local anglers,

Table 5. Statistics for largemouth bass tournaments on La Grange and Peoria reaches of the Illinois River (1992-1995).

	Tournaments	Anglers	Days	Fish	F/A/D*	Weight (lbs)	Avg. Wt. (lbs)
1992	8			576		873.60	1.52

	Tournaments	Anglers	Days	Fish	F/A/D*	Weight (lbs)	Avg. Wt. (lbs)
1993	13	1,209	1,209	1,061	0.88	1,691.49	1.59
1994	43	1,687	1,687	3,115	1.85	5,191.06	1.67
1995	42	1,567	1,676	2,041	1.22	3,787.51	1.86
Totals	98	4,463	4,572	6,217	1.34	10,670.06	1.71

1992-1995	Totals	6,793		11,543.66	1.70

* Fish/Angler/Day

many had never fished the Illinois River prior to 1993.

A concern expressed by tournament anglers was that releasing bass at a boat ramp or in a marina left the fish vulnerable to harvest by heavy pressure from non-tournament anglers. To investigate this, we tagged and released bass at two boat ramps to see how many would be recaptured and harvested by anglers. The tournaments took place on August 29, 1993, at Pekin and on August 7, 1994, at Havana (Table 6). About 25% of the fish released at both locations were recaptured by non-tournament anglers who harvested 6.3% and 12.4% of the fish released at each ramp, so harvest rates were actually pretty low. As was the case with all estimates based upon recaptured fish, these estimates were probably conservative because anglers may have caught but not reported some recaptures. The percent of these fish harvested was not significantly higher than those we listed earlier for all tagged fish combined, but harvest rates may have been higher if we had released large numbers of tagged bass in more confined areas such as marinas.

What impacts are bass tournaments having on the fishery? Tournament anglers recaptured about 10.7% of the bass we tagged from 1992 to 1995 and 13.9% of those from the Snicarte Slough population study. So our best estimate would be that tournament anglers catch about 10-15% of the total catchable population, which we consider light exploitation. Tournament anglers were very cooperative in notifying us when they caught tagged bass; however, they undoubtedly caught a higher percentage of tagged fish than they reported. Many reported recaptures eagerly during the first two years of the study but became less likely to report them during the last two years. Tournament anglers were frequently hurried during competition, and many considered it inconvenient to record a tag number while fishing. The rapid processing of bass at weigh-ins to reduce stress commonly resulted in recaptured bass being released back into the river without the tag number ever being recorded.

If largemouth bass numbers in La Grange and Peoria Reaches remain high, as they have since 1992, we doubt either tournament or non-tournament anglers are impacting a large enough portion of the population to have a negative impact (based upon current harvest rates). Their impact could be more significant, however, if several poor year classes are produced in successive years. This would limit recruitment into the adult population, while anglers continue to harvest and move bass from heavily pressured areas which generally hold the highest densities.

While tournament anglers as a rule do not harvest bass, they may still have negative impacts on the fishery. Tournament anglers commendably go to great lengths to insure the survival of their catch, and many tournaments enforce stiff penalties for dead fish at weigh-ins. However, some fish die before weigh-ins and others suffer delayed mortality after their release. Since 1992 we have documented approximately 6,793 bass that have been taken out of their home areas by tournament anglers. Of the tagged bass we released after electrofishing, 66.7% were recaptured in the same general area in which they were released versus 32.9% for those we released after tournaments. Of those released in their home area after electrofishing, 79.8% were recaptured within one mile of their release point versus 56.3% released after tournaments. Bass transported

Table 6. Largemouth bass released at boat ramps after bass tournaments and recaptured by leisurely anglers.

Date	Location	Number Tagged and Released	Total Number (Percent) Recaptured	Total Number (Percent) Harvested
29-Aug-93	Pekin, IL	32	8 (25.0%)	2 (6.3%)
07-Aug-94	Havana, IL	169	42 (24.9%)	21 (12.4%)

Table 7. Average weight of Illinois River largemouth bass at given lengths, which could be used as a guide at "bump and run" tournaments.

Length (inches)	Weight (pounds)
12	0.99
12.5	1.12
13	1.3
13.5	1.44
14	1.68
14.5	1.88
15	2.02
15.5	2.24
16	2.48
16.5	2.79
17	3.01
17.5	3.24
18	3.48
18.5	3.68
19	4.42
19.5	4.88

by anglers and released after tournaments were on the average recaptured farther away from their release points (3.1 miles, 5.0 km) than were bass we electrofished and released in their home areas (1.8 miles, 2.9 km). These results are not surprising because bass translocated away from their home area are likely to move from their release point if suitable habitat is not present. After tournament weigh-ins, bass are commonly released at the boat ramp which is often along the main channel border. Many of those fish will move upstream or downstream in search of backwater habitat, as we demonstrated previously.

We were unable to document any homing (returning to their home area) by tagged bass after being released five miles or more away from their home territory, but we did document some homing by bass released within a few miles of their capture location. In most of these cases, the release site was probably part of their home range (Lewis and Flickinger 1967), and those fish simply returned to a location they were familiar with. For example, a bass may have been caught in Quiver Lake during a tournament, weighed in and released at the main channel border at Havana and eventually swam back to Quiver Lake. Note that in Table 1, some bass tagged and released at Towhead Island, Coal Dock Cove, Havana Marina and Havana main channel border were recaptured in Quiver Lake, indicating home areas may extend from Havana to Quiver Lake or beyond.

Nearly all of the bass weighed in by tournament anglers are displaced from their home area which dilutes bass densities in those areas and stockpiles fish near weigh-in locations. The reason bass densities are greater in certain habitats is because these areas meet their living requirements. Many habitats in which bass are released after tournaments cannot meet their requirements, and this forces them to search for more suitable habitats. Tournament organizers have been increasingly conscious of the need to redistribute largemouth bass away from the centralized weigh-in location and have provided release boats equipped with livewells. We redistributed bass after tournaments and found it very difficult to travel more than about 5 miles (8 km) in either direction by boat to release fish. At one particularly large tournament (168 boats) in 1993, we used a fish hauling truck to move bass from the weigh-in location (Pekin) to the Bath Chute area. Even with these efforts, few of the fish are actually released back into their home area. This is because anglers may catch fish many miles from the weigh-in site and at any number of locations, and it is impractical to return the fish to those locations. During the BASSMASTERS SuperStars Tournament the weigh-in and launch location was at Peoria, and anglers could fish the entire 161-mile (259 km) stretch from the Starved Rock Lock and Dam to the La Grange Lock and Dam. A majority of the contestants fished in the La Grange Reach each year, fishing as far downstream as Beardstown, 76 river miles from Peoria. Furthermore, bass that are not released at the weigh-in location are commonly placed together in livewells prior to redistribution, making it impossible to determine their exact capture location.

Management Recommendations

Although no length limit is currently in effect, a 12" (305 mm) minimum length limit on Illinois River largemouth bass certainly would not hurt the population and may help protect it in future years. Our data

indicate that largemouth bass spawning success and recruitment are largely dependent upon river levels with minimal impacts from angling, so the benefit of a minimum length limit may be small or negligible. When any minimum length limit is implemented, fish may stockpile at or below the limit (≤ 12"), causing intense competition for food, resulting in slower growth (Novinger 1984). We doubt this will be a problem in the Illinois River because forage is generally very abundant. Furthermore, many piscivorous species prey upon the forage in the Illinois River, and largemouth bass likely account for only a small amount of the total predation. We have determined that Illinois River largemouth bass begin to achieve sexual maturity at about 10" (254 mm) long and are being harvested by anglers at 9" (230 mm) long. A 12" (305 mm) minimum length limit would allow bass the opportunity to reach maturity and spawn at least once before being harvested. A minimum length limit would also draw attention to the Illinois River fishery and let anglers know we think the resource is worth managing and that their cooperation is needed. We doubt the public would be opposed to such a regulation, and a 12-inch (305 mm) minimum length limit would not affect tournament anglers because they have already voluntarily adopted this regulation. Perhaps smallmouth bass (*Micropterus dolomieui*) should be included in the regulation to eliminate confusion between the species. Our studies indicate smallmouth bass are present in low numbers in La Grange and Peoria Reaches, but Lerczak et al (1995) collected larger numbers from Starved Rock upstream to RM 273.

In addition to promoting catch and release to non-tournament anglers, we encourage tournament anglers genuinely interested in the welfare of the fishery to adopt tournament formats where bass do not have to be brought to a central weigh-in location. A format where fish are released in the area where they are caught would be much less stressful to the fish and would undoubtedly decrease tournament-related mortality. Immediate, on-site release at some tournaments would also reduce the number of bass removed from their natural habitat and stockpiled near weigh-in sites. Table 7 is a list of average weight by length we calculated from all largemouth bass we have collected since 1992. This table could be used at "bump and run" tournaments to approximate the weight of each bass caught based on its length, so they could be released immediately. Another approach would be for tournament contestants to weigh and record their own fish on a standard scale and release it ("weigh and run"). Local clubs or tournament organizations could purchase standard scales for their participants, or each individual could be responsible for purchasing a standard, agreed-upon scale. If centralized tournament weigh-ins had not been held from 1992 to 1995, 6,793 bass would not have been removed from their home areas. Many tournament promoters or clubs are reluctant to change from the central weigh-in format because they feel it is necessary to keep anglers honest about their catch. Alternative strategies exist and can be implemented if only tournament anglers will explore the possibilities. Tournament anglers have made giant strides in releasing their catch alive by learning how to minimize stress to the fish. Why not take this practice one step further and find ways to release fish when and where they are caught and still have a pleasurable and competetive tournament experience.

Perhaps the most effective strategy for managing any Illinois River fish species is to work toward increasing available spawning, nursery and wintering habitats. Human impacts we discussed previously have reduced the area of the floodplain available to fish and have severely degraded backwater habitats. Today suitable spawning, nursery and wintering habitats are limited when river levels are low, which can greatly reduce cohort survival. Largemouth bass production has been high in years with spring flooding when fish had access to the floodplain during spawning (Raibley et al. in preparation). When river levels fell during winter, we observed deteriorating water quality and bass mortality in backwaters (Raibley et al. submitted). Restoring a more natural hydrological regime is critical to optimizing fish production and survival in the Illinois River and will increase available habitat and reduce river level fluctuations. By better managing the river's hydrological regime and rehabilitating backwaters, we can more effectively manage the availability and quality of spawning, nursery and wintering habitat.

Conclusion

This study has provided valuable data on largemouth bass movements, harvest rates, population densities and tournament statistics. This is the first information of its kind for Illinois River largemouth bass populations and provides a baseline for future comparisons. Biologists may be able to use our data for comparisons with those collected from other large river-floodplain ecosystems. We could not feasibly present all of the data we have collected, and anyone interested in more detailed information from our studies can contact us. Much of the information not presented here may be valuable in the future should information be required on fish use of specific habitats in La Grange and Peoria Reaches. We plan to continue monitoring largemouth bass and other Illinois River fish populations in the future because we believe establishing a long-term data set is imperative to understanding the dynamic nature of these populations. Anglers who fish the Illinois River should be able to use the information we have presented to better understand largemouth bass movement patterns, and should find the maps for La Grange Reach useful. We hope the data we have collected will be used to start managing the largemouth bass fishery in La Grange and Peoria Reaches of the Illinois River so we can sustain or enhance the quality of this resource in the future.

Acknowledgements

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References

Bellrose, F. C., S. P. Havera, F. L. Paveglio, Jr. and D. W. Steffeck. 1983. The fate of lakes in the Illinois River valley. Illinois Natural History Survey, Biological Notes No. 119, Champaign.

Cohen, N. H., S. P. Bartlett and A. Lenke. 1899. Report of the Illinois state fish commissioner from October 1, 1896 to September 30, 1898:3-42.

Havera, S. P. 1992. Waterfowl of Illinois: Status and Management. Illinois Department of Conservation, Federal Aid in Wildlife Restoration, Project W-110-R-2, Final Report.

Kofoid, C. A. 1903. Plankton studies. IV. The plankton of the Illinois River, 1894-1899, with introductory notes on the hydrography of the Illinois River and its basin. Part I. Quantitative investigations and general results. Illinois State Laboratory of Natural History Bulletin 6(2):95-635.

Lerczak, T.V., K.D. Blodgett and R.E. Sparks. 1995. The long-term Illinois River fish population monitoring program (F-101-R). Final Report to the Illinois Department of Conservation. Aquatic Ecology Technical Report 95/4. Illinois Natural History Survey, Champaign, Illinois.

Lerczak, T.V. and R.E. Sparks. 1995. Fish populations in the Illinois River. Pages 239-241 in E.T. Large, G.S. Farris, C.E. Puckett, P.D. Doran and M.J. Mac, editors. Our Living Resources: A report to the nation on the distribution, abundance and health of U.S. plants, animals and ecosystems. U.S. Department of the Interior, National Biological Service, Washington, D.C. 530 pp.

Lewis, W.M. and S. Flickinger. 1967. Home range tendency of the largemouth bass (*Micropterus salmoides*). Ecology 48:1020-1023.

Mills, H. B., W. C. Starrett and F. C. Bellrose. 1966. Man's effect on the fish and wildlife of the Illinois River. Illinois Natural History Survey Biological Notes No. 57, Champaign.

Mulvihill, W. F. and L. D. Cornish. 1929. Flood control report; an engineering study of the flood situation in the state of Illinois. Illinois Division of Waterways.

Novinger, G.D. 1984. Observations on the use of size limits for black basses in large impoundments. Fisheries 9(4):2-6.

Pitlo, J. Jr. 1992. An evaluation of largemouth bass populations in the Upper Mississippi River. Iowa Department of Natural Resources, Federal Aid in Sportfish Restoration, Project F-109-R, Final Report, Des Moines.

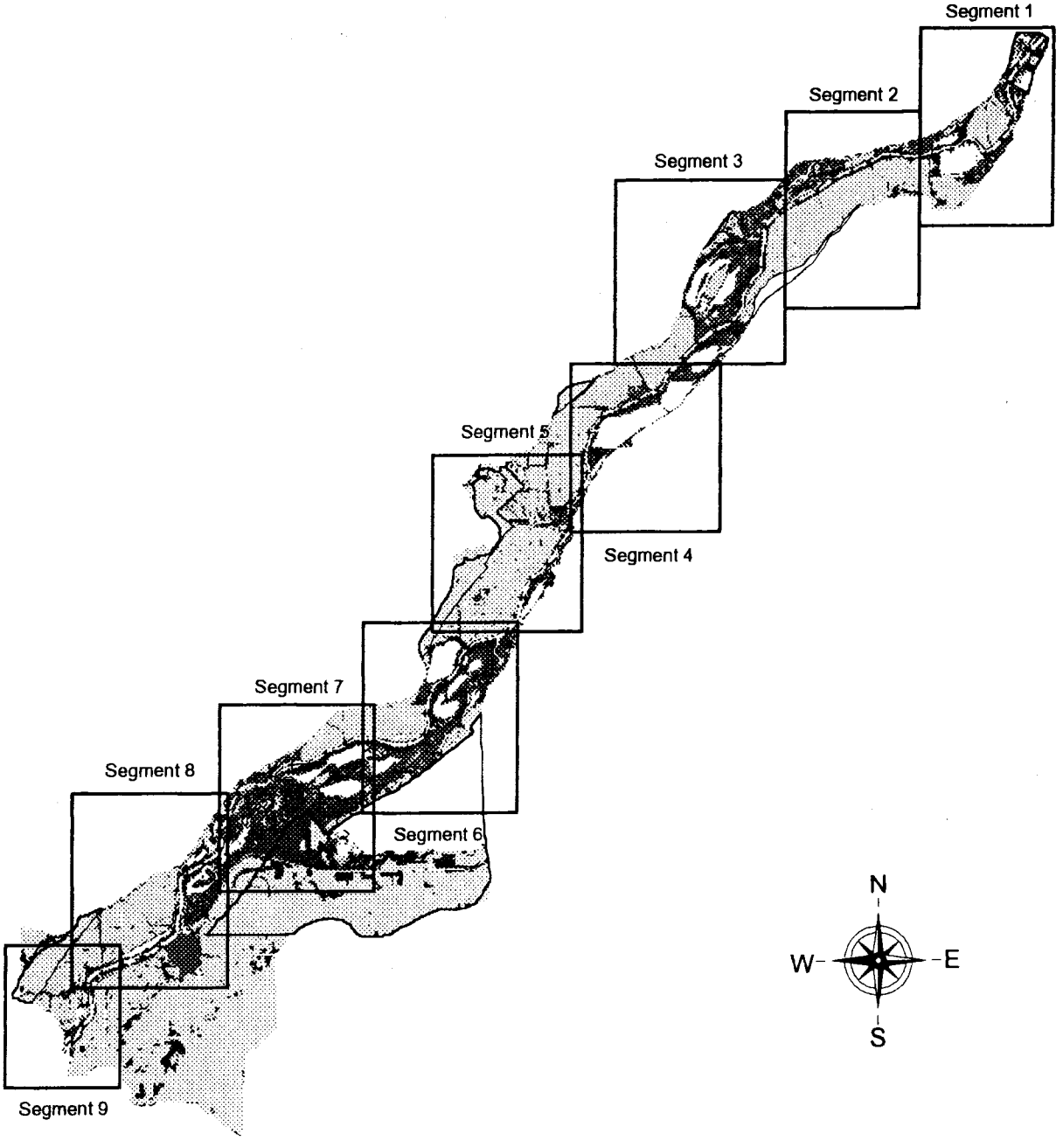
Raibley, P.T., K.S. Irons,T.M. O'Hara, K.D. Blodgett and R.E. Sparks. submitted. Winter habitats used by largemouth bass in the Illinois River, a large river-floodplain ecosystem.

Raibley, P.T., T.M. O'Hara, K.S. Irons, K.D. Blodgett and R.E. Sparks. in preparation. Largemouth bass population structure under varying annual hydrological regimes in the Illinois River, a large river-floodplain ecosystem.

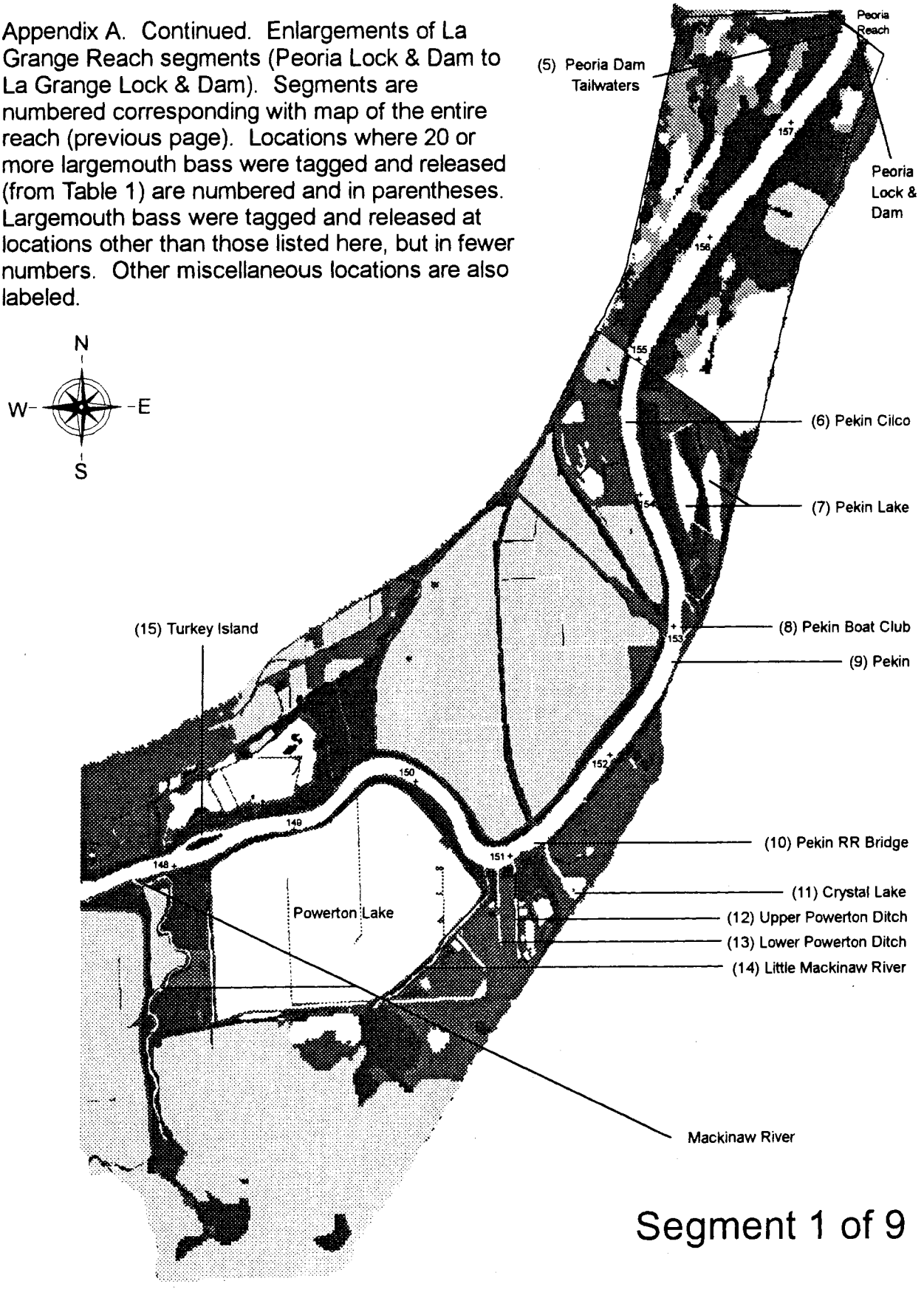
Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin 191. Fisheries Research Board of Canada, Ottawa, Ontario.

Sparks, R.E. and W.C. Starrett. 1975. An electrofishing survey of the Illinois River, 1959-1974. Illinois Natural History Survey Bulletin 31(8):317-380.

Appendix A. La Grange Reach of the Illinois River (Peroia Lock & Dam to the La Grange Lock & Dam). The reach is divided into nine segments which are enlarged on the following pages.



Appendix A. Continued. Enlargements of La Grange Reach segments (Peoria Lock & Dam to La Grange Lock & Dam). Segments are numbered corresponding with map of the entire reach (previous page). Locations where 20 or more largemouth bass were tagged and released (from Table 1) are numbered and in parentheses. Largemouth bass were tagged and released at locations other than those listed here, but in fewer numbers. Other miscellaneous locations are also labeled.



Segment 1 of 9

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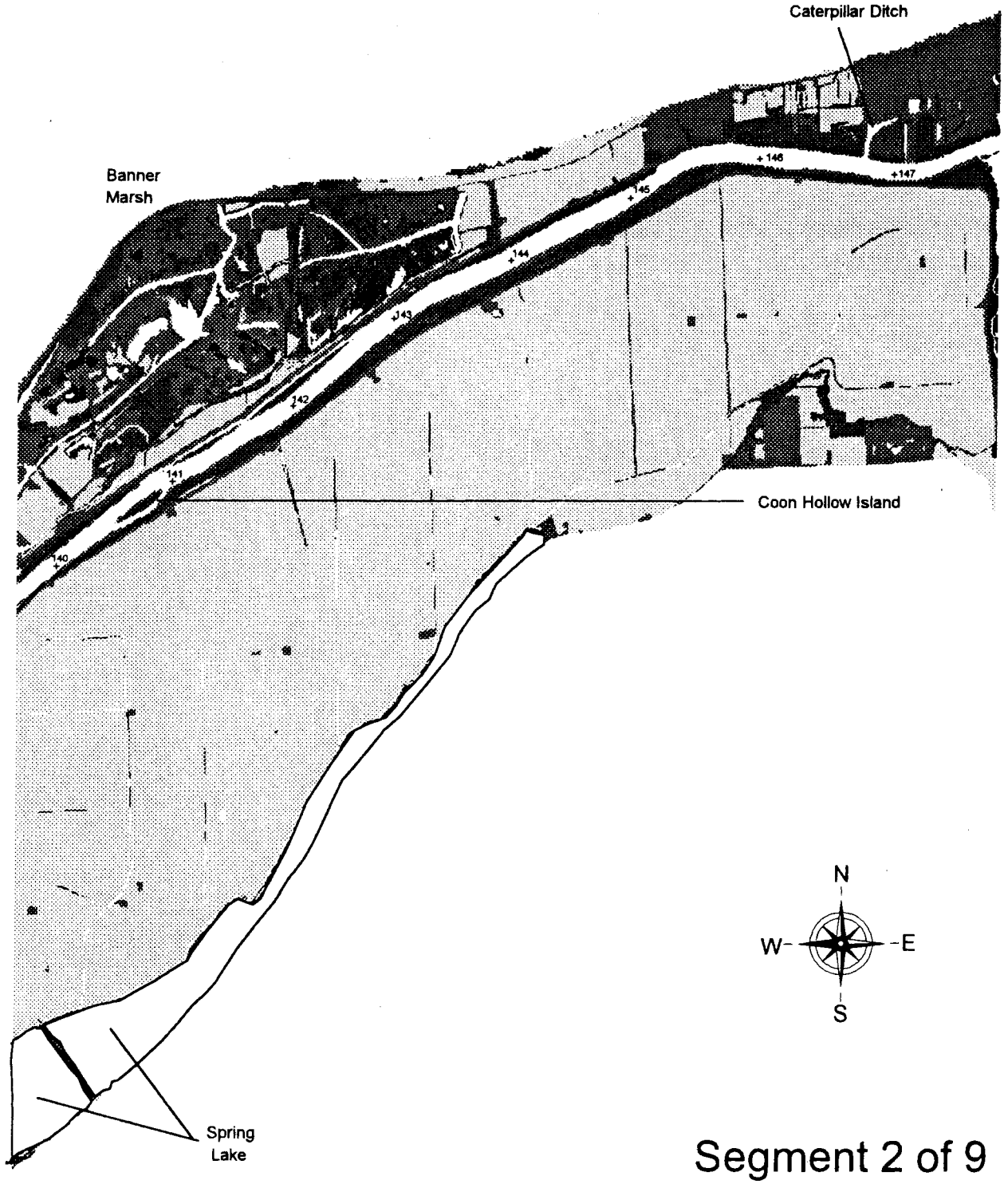

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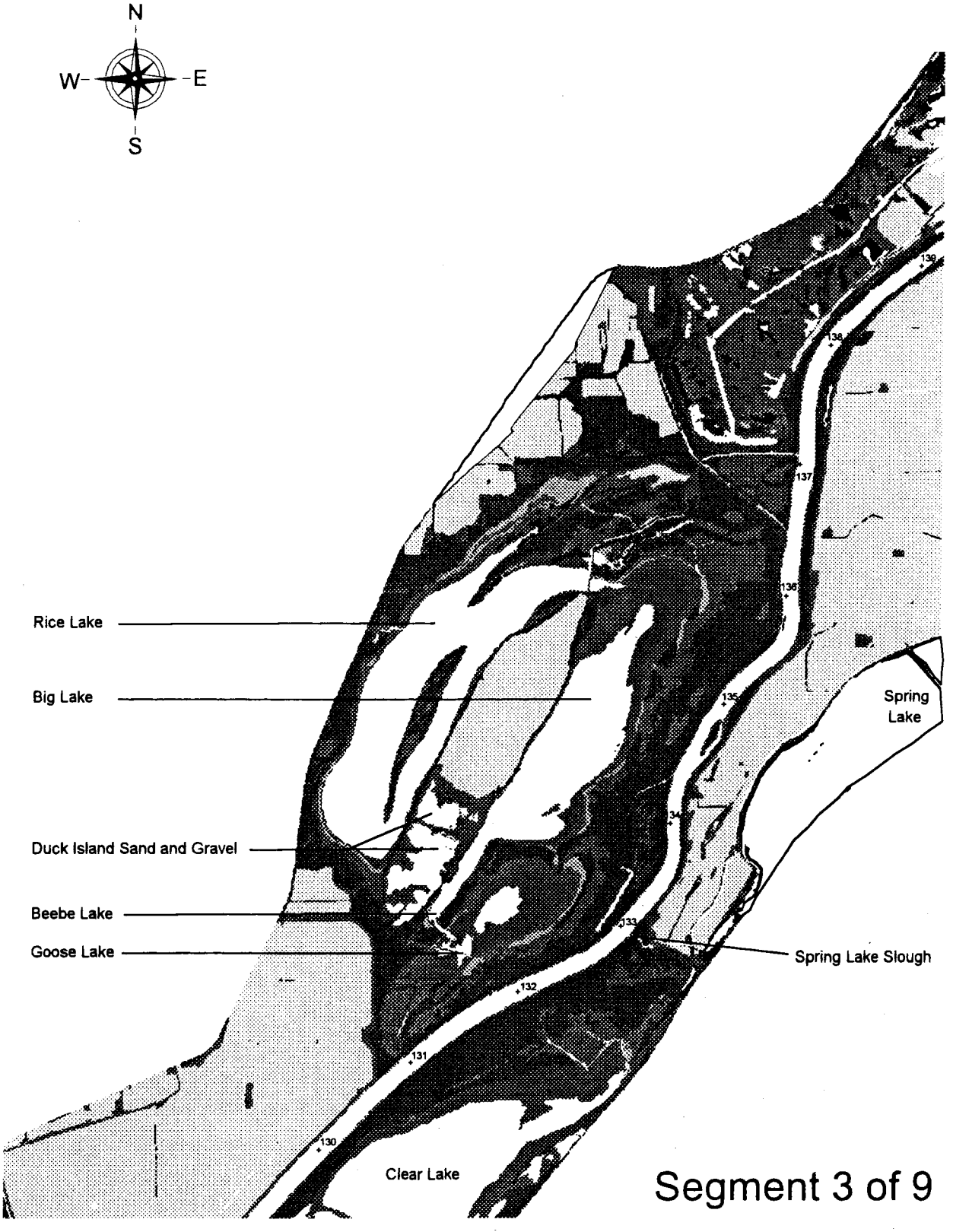

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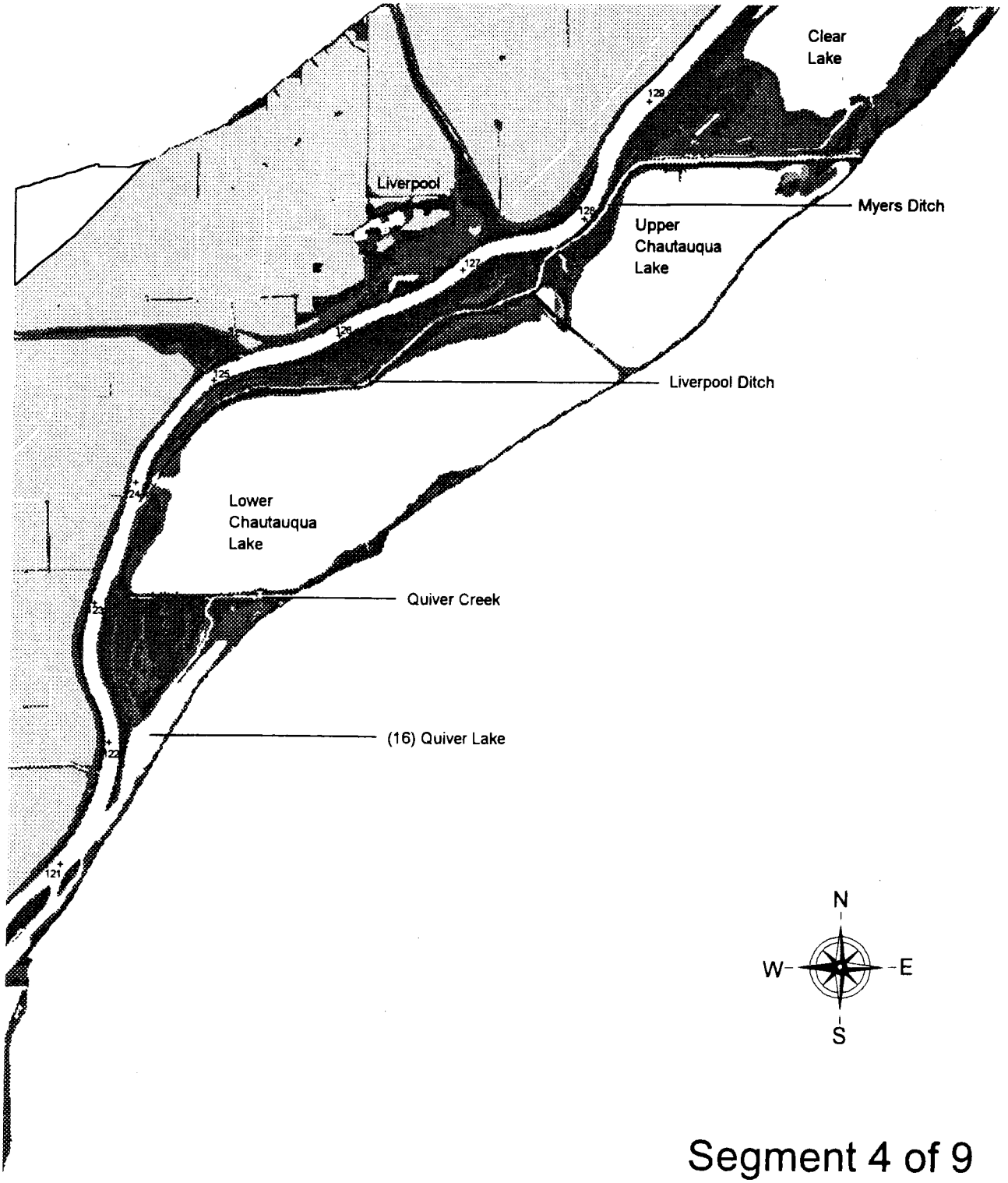

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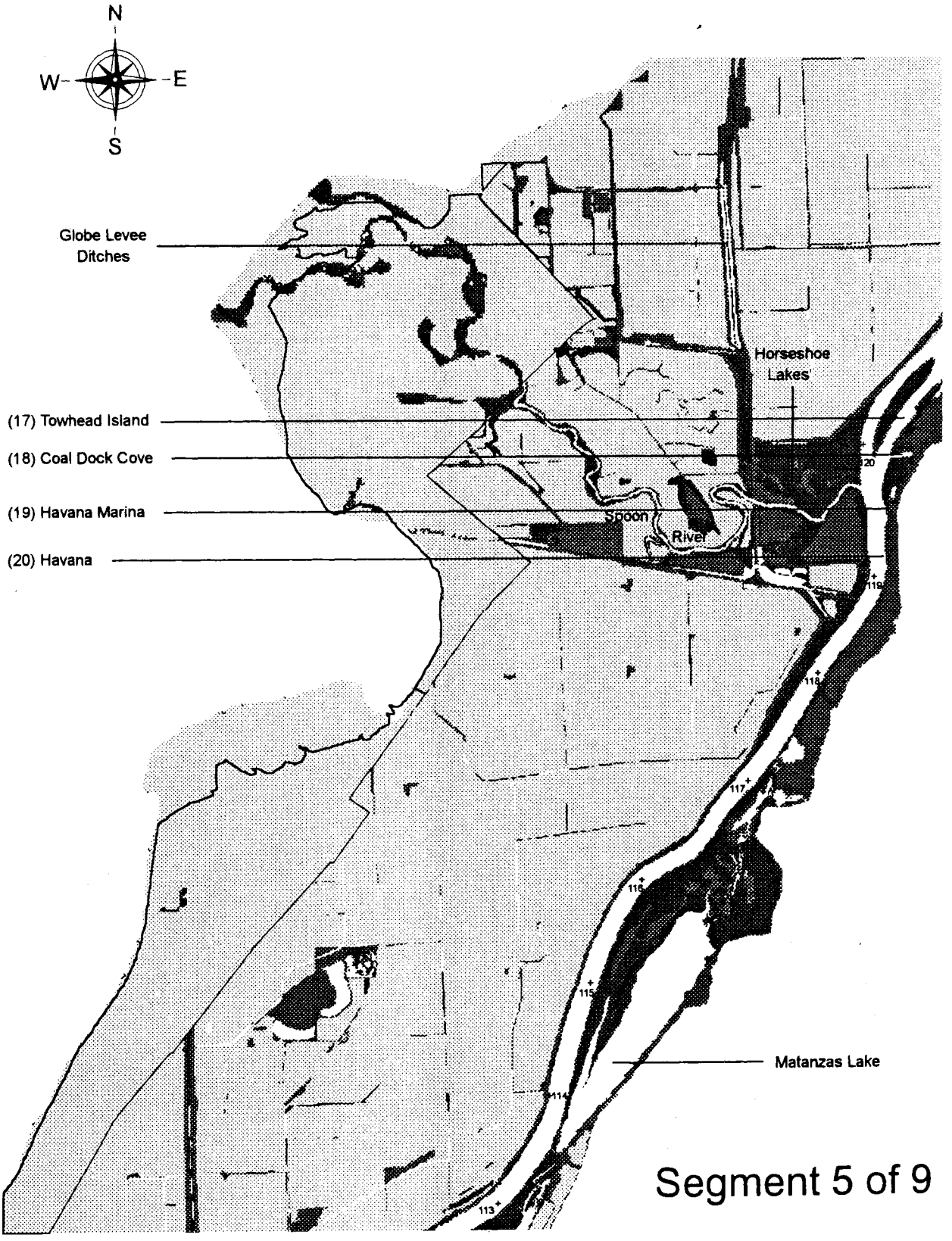

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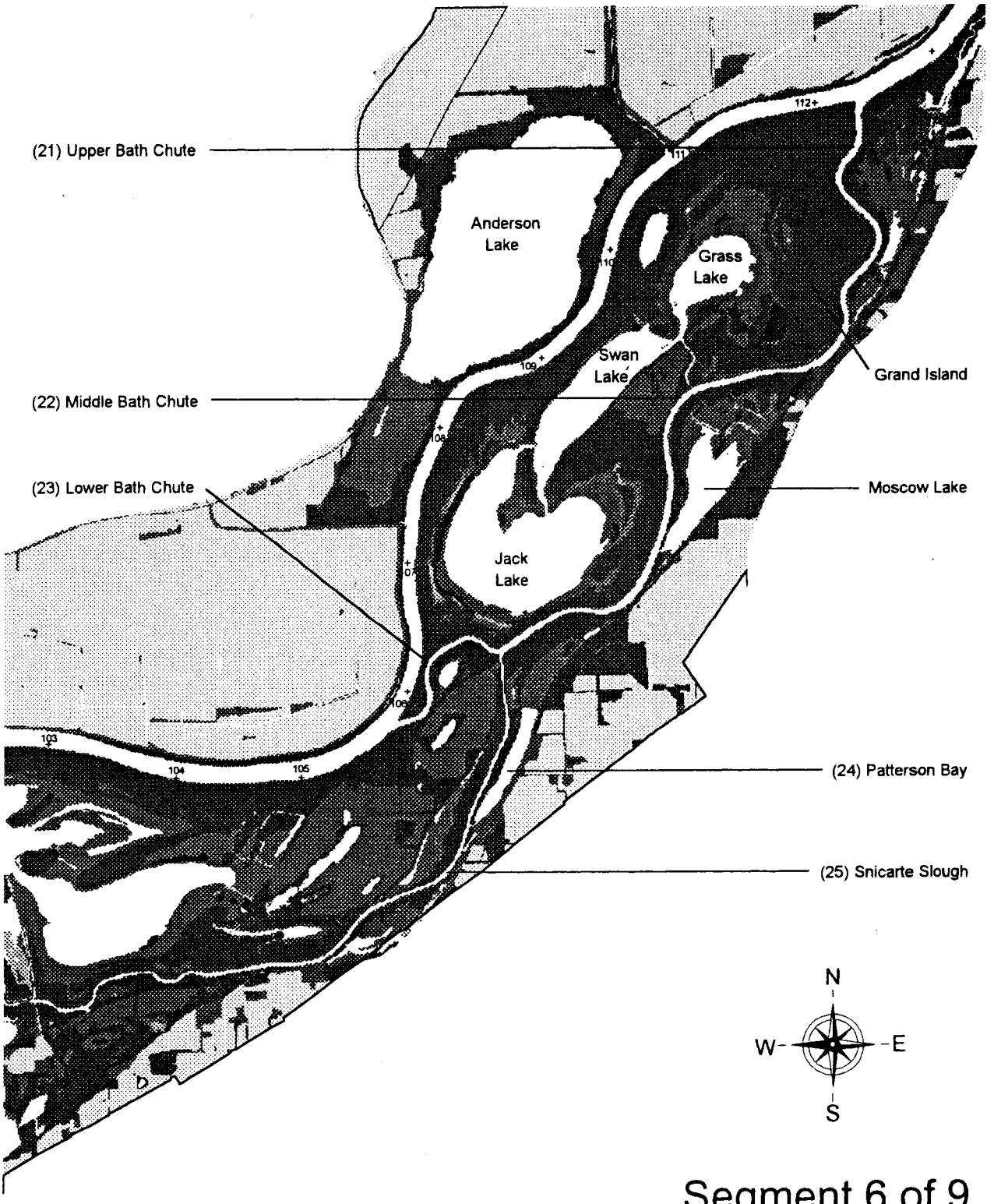

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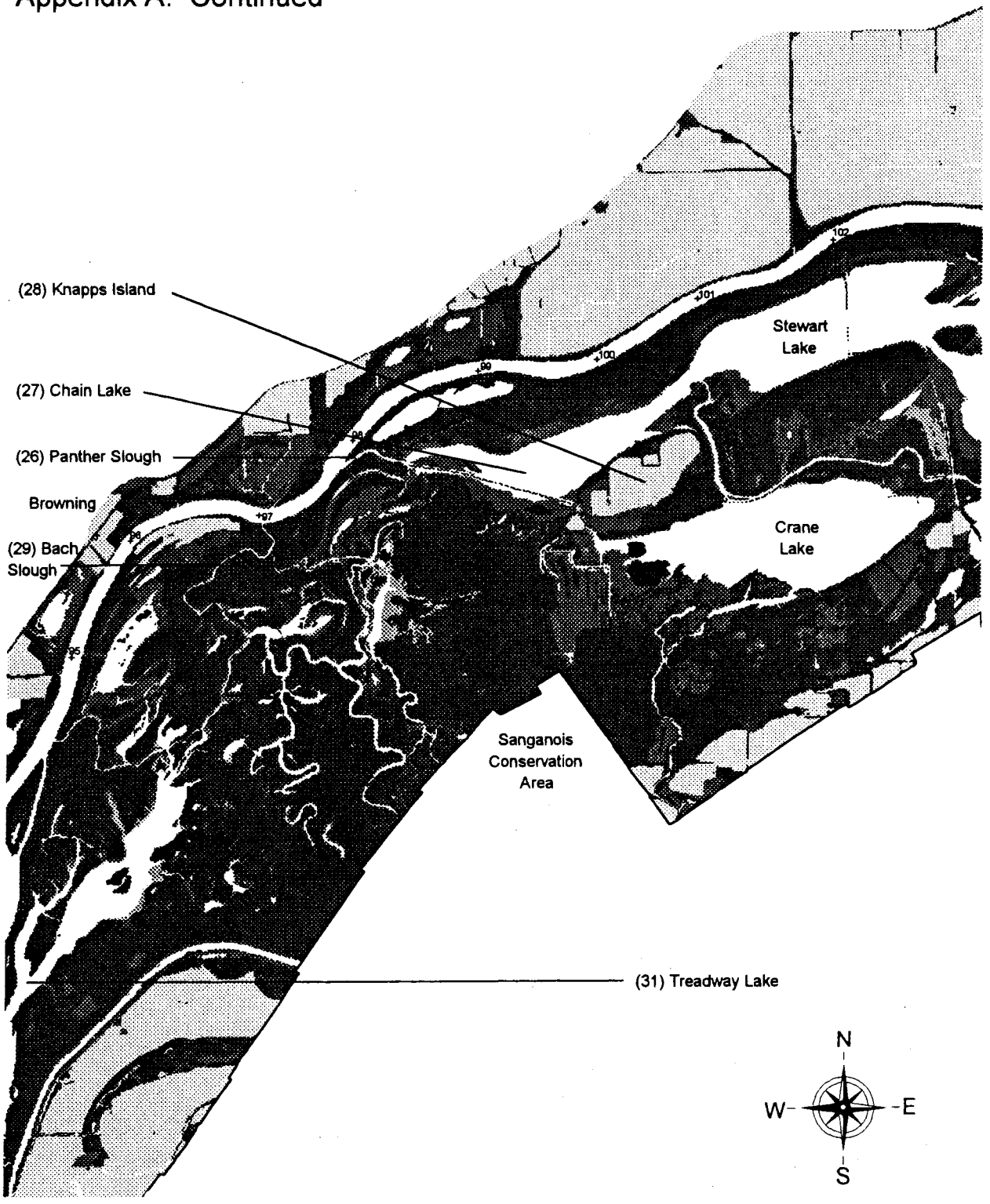

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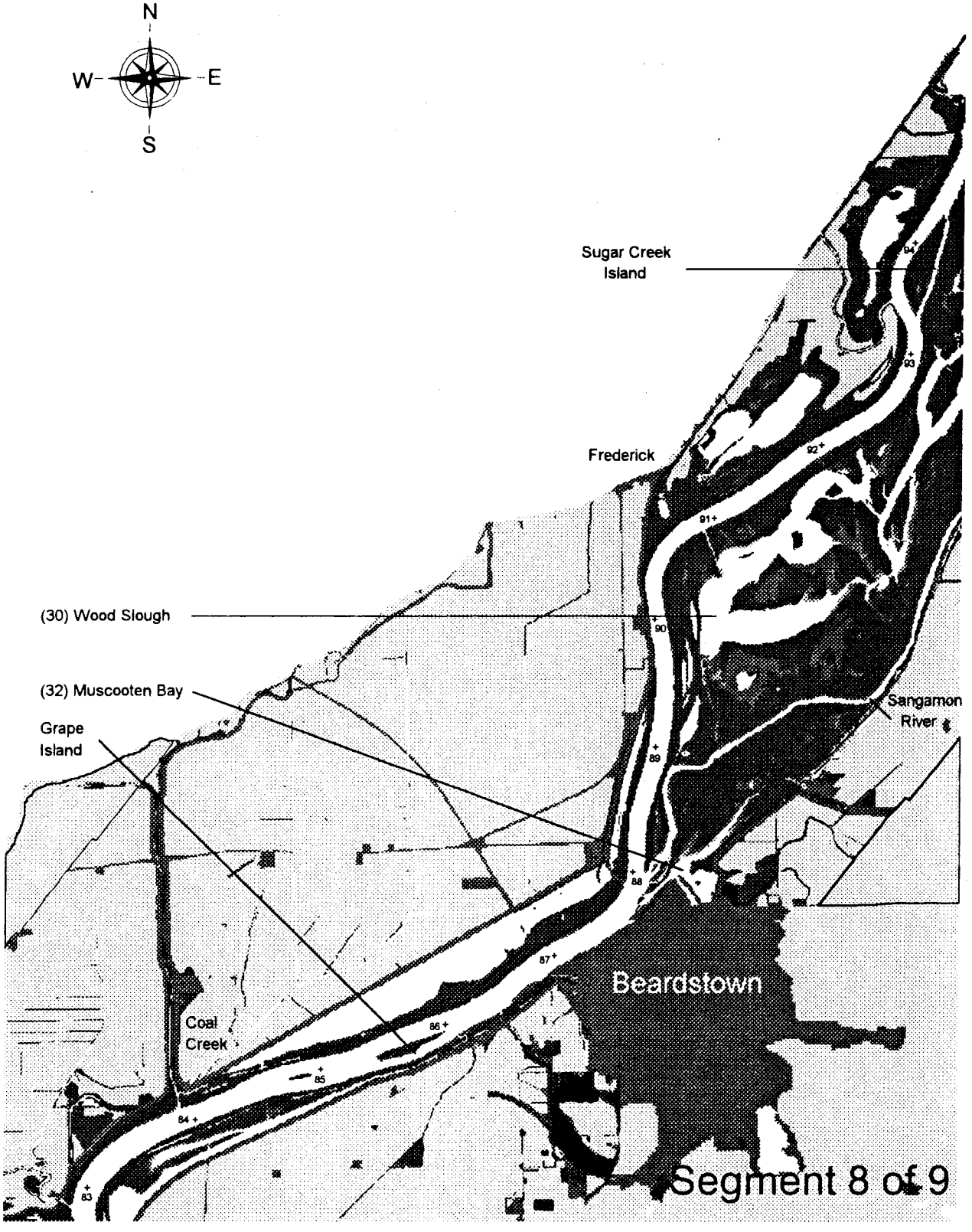

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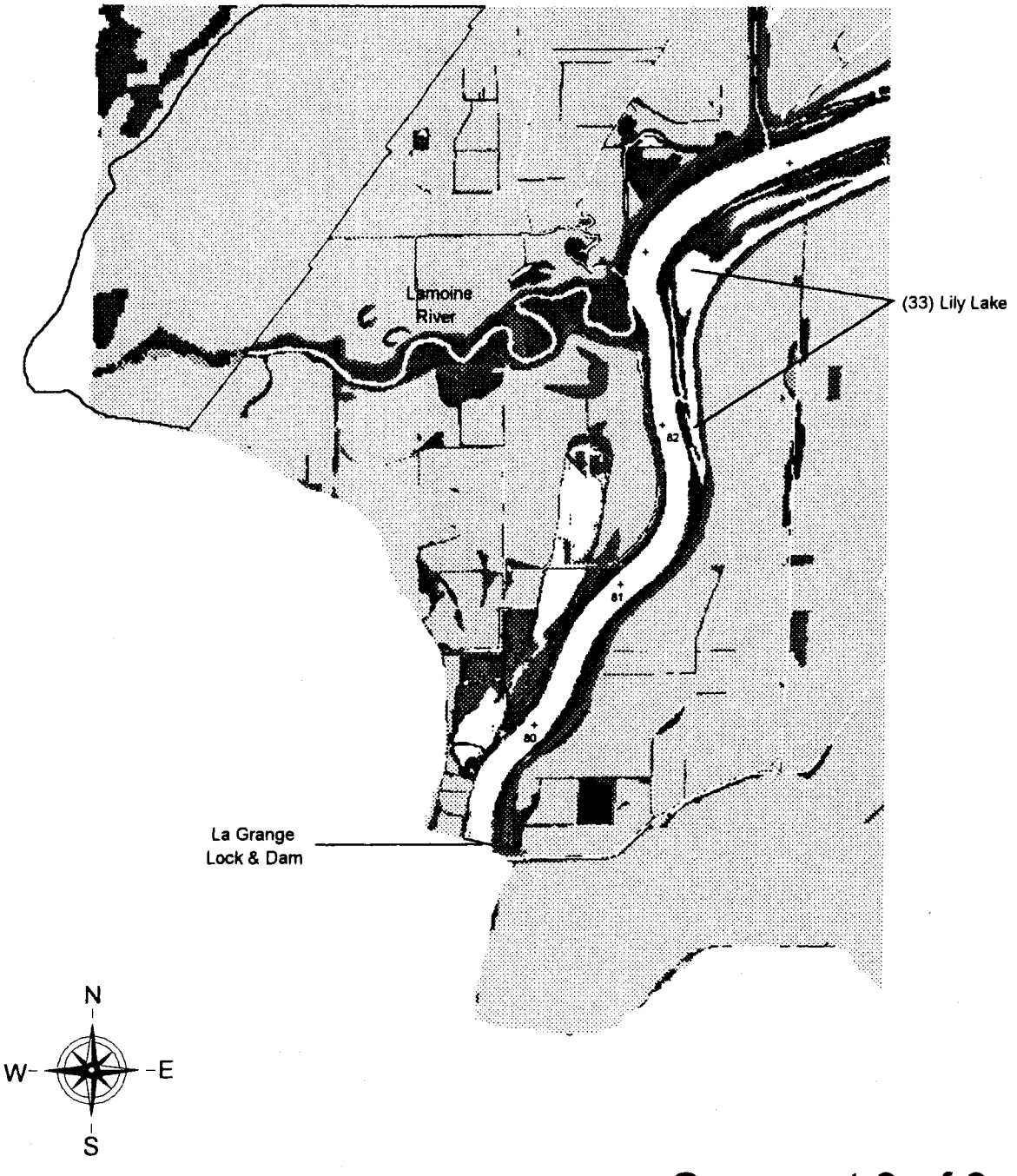

Segment 9 of 9

Appendix B. Tournament statistics for La Grange and Peoria Reaches of the Illinois River (1992).

Date	Sponsor	Location	Number Fish	Total Weight (lbs)	Average Weight (lbs)
06/27/92	Scott County Bass Club	Browning	33	43.75	1.33
07/19/92	Canton Bass Club	Havana	53	75.10	1.42
08/02/92	Glasford Bass Club	Havana	44	67.80	1.54
08/08/92	Illini Lunker Hunters	Havana	33	44.88	1.36
08/09/92	American Scholarship	Pekin Boat Club	216	348.00	1.61
08/23/92	Galesburg BassMasters	Havana	74	114.55	1.55
08/30/92	Heart of Illinois BassMasters	Peoria Heights	70	94.46	1.35
09/20/92	Open Tournament	Havana	53	85.06	1.60
		Totals	**576**	**873.60**	**1.52**

Appendix B. Tournament statistics for La Grange and Peoria Reaches of the Illinois River (1993).

Date	Sponsor	Location	Number Anglers	Angling Days	Number Fish	Fish Per Angler Per Day (F/A/D)	Total Weight	Average Weight
06/19/93	American Scholarship	Detweiller Marina, Peoria	35	35	53	1.51	90.38	1.71
06/10/93	BassMasters SuperStars	Civic Center, Peoria	28	28	77	2.75	124.31	1.61
06/11/93	BassMasters SuperStars	Civic Center, Peoria	28	28	65	2.32	109.69	1.69
06/12/93	BassMasters SuperStars	Civic Center, Peoria	28	28	47	1.68	87.44	1.86
05/30/93	Central Ill. Boat Dealer/Tackle Manuf. Open	Pekin Boat Club	108	108	134	1.24	201.47	1.50
05/09/93	Fulton County Tournament Association	RF Park, Havana	24	24	16	0.67	24.57	1.54
08/29/93	Galesburg BassMasters	Pekin City Ramp	38	38	53	1.39	87.82	1.66
07/18/93	Glasford B.A.S.S.	Wesley Road, E. Peoria	28	28	6	0.21	12.00	2.00
09/19/93	Glasford B.A.S.S.	Liverpool						
10/09/93	Glasford B.A.S.S.	Detweiller Marina, Peoria	23	23	19	0.83	31.25	1.64
06/05/93	Illinois B.A.S.S. Federation (8-man team)	Pekin Boat Club	336	336	219	0.65	312.15	1.43
06/06/93	Illinois B.A.S.S. Federation (8-man team)	Pekin Boat Club	336	336	208	0.62	321.50	1.55
10/02/93	Illinois B.A.S.S. Federation (Classic)	Spindler's Marina, E. Peoria						
10/03/93	Illinois B.A.S.S. Federation (Classic)	Spindler's Marina, E. Peoria	72	72	21	0.29	47.54	2.26
08/28/93	Illinois Lunker Hunters	Henry	29	29	26	0.90	38.88	1.50
08/29/93	Illinois Team Tournament Association	Pekin City Ramp	62	62	104	1.68	181.49	1.75
Unavailable	Northern Illinois BassMasters	Pekin City Ramp	20	20	8	0.40	12.00	1.50
07/11/93	Rivercity Casters	Pekin City Ramp	14	14	5	0.36	9.00	1.80
		Totals	**1,209**	**1,209**	**1,061**	**0.88**	**1,691.49**	**1.59**

Appendix B. Tournament statistics for La Grange and Peoria Reaches of the Illinois River (1994).

Date	Sponsor	Location	Number Anglers	Angling Days	Number Fish	Fish Per Angler Per Day (F/A/D)	Total Weight	Average Weight
05/08/94	American Scholarship	Pekin City Ramp	74	74	137	1.85	251.71	1.84
08/14/94	American Scholarship	RF Park, Havana	64	64	156	2.44	309.60	1.98
06/08/94	BassMasters SuperStars (Practice)	Civic Center, Peoria	29	29	5	0.17	8.19	1.64
06/09/94	BassMasters SuperStars	Civic Center, Peoria	29	29	109	3.76	192.30	1.76
06/10/94	BassMasters SuperStars	Civic Center, Peoria	30	30	93	3.10	153.60	1.65
06/11/94	BassMasters SuperStars	Civic Center, Peoria	30	30	91	3.03	162.30	1.78
08/27/94	BiState Bassers	Browning, IL	19	19	28	1.47	44.20	1.58
09/04/94	Bloomington/Normal Bass Club	RF Park, Havana	43	43	92	2.14	154.14	1.68
08/20/94	Buell's Open	RF Park, Havana	94	94	233	2.48	349.59	1.50
07/10/94	Central Ill. Boat Dealer/Tackle Manuf. Open	Pekin Boat Club	98	98	269	2.74	422.12	1.57
07/30/94	F.O.C.A.S.	RF Park, Havana	18	18	20	1.11	36.13	1.81
06/12/94	Fulton County Tournament Association	Detweiller Marina, Peoria	34	34	39	1.15	61.86	1.59
08/07/94	Fulton County Tournament Association	RF Park, Havana	44	44	73	1.66	114.62	1.57
09/04/94	Fulton County Tournament Association	Pekin City Ramps	28	28	37	1.32	62.02	1.68
09/25/94	Fulton County Tournament Association	Liverpool	34	34	35	1.03	51.68	1.48
07/17/94	Galesburg BassMasters	RF Park, Havana	40	40	89	2.23	155.17	1.74
06/19/94	Glasford B.A.S.S.	RF Park, Havana	26	26	49	1.88	84.34	1.72
07/10/94	Glasford B.A.S.S.	Pekin City Ramps	24	24	34	1.42	59.98	1.76
09/18/94	Glasford B.A.S.S.	Liverpool	24	24	13	0.54	20.23	1.56
10/09/94	Glasford B.A.S.S.	RF Park, Havana	18	18	25	1.39	48.09	1.92
05/29/94	Heart of Illinois B.A.S.S., BMSS Fundraiser	Hamm's Harbor, Chillicothe	74	74	174	2.35	320.28	1.84
06/26/94	Illinois B.A.S.S. Federation	Pekin Boat Club	196	196	279	1.42	439.88	1.58
05/07/94	Illinois Central B.A.S.S.	RF Park, Havana	30	30	17	0.57	32.30	1.90
06/25/94	Illinois Central B.A.S.S.	Detweiller Marina, Peoria	38	38	51	1.34	83.68	1.64
08/07/94	Illinois Central B.A.S.S.	RF Park, Havana	38	38	107	2.82	172.10	1.61
07/09/94	Illinois Lunker Hunters	Wesley Road, E. Peoria	32	32	16	0.50	24.40	1.53
09/17/94	Illinois Lunker Hunters	RF Park, Havana	24	24	26	1.08	37.81	1.45
09/18/94	Illinois Team Tournament Association	RF Park, Havana	80	80	122	1.53	185.66	1.52
06/05/94	Illinois Valley BassMasters	RF Park, Havana	14	14	24	1.71	38.00	1.58
09/10/94	Jacksonville Bass Club	Frederick Ramp	4	4	2	0.50	6.75	3.38
09/10/94	Jacksonville Bass Club	Bath Ramp	9	9	17	1.89	25.38	1.49
05/15/94	Monocoeur	RF Park, Havana	20	20	18	0.90	29.00	1.61
06/26/94	Monocoeur	Lacon	25	25	32	1.28	34.50	1.08
05/01/94	Midwest Bass Association	Pekin Boat Club	25	25	44	1.76	99.34	2.26
06/05/94	Midwest Bass Association	Beardstown Marina	34	34	113	3.32	208.97	1.85
06/26/94	Midwest Bass Association	RF Park, Havana	34	34	95	2.79	154.88	1.63
08/21/94	Midwest Bass Association	RF Park, Havana	27	27	56	2.07	104.26	1.86
09/18/94	Midwest Bass Association	Pekin Boat Club	26	26	31	1.19	51.71	1.67
07/23/94	Northern Illinois BassMasters	Havana, RF Park	20	20	19	0.95	31.80	1.67
07/24/94	Northern Illinois BassMasters	Havana, RF Park	18	18	28	1.56	48.60	1.74
07/17/94	Northland Invitational	Pekin Boat Club	46	46	86	1.87	110.00	1.28
08/21/94	Peoria BassMasters	Bath Chute	12	12	22	1.83	35.88	1.63
09/18/94	Peoria BassMasters	Bath Chute	10	10	8	0.80	13.06	1.63
10/08/94	Peoria BassMasters	Bath Chute	6	6	9	1.50	17.62	1.96
10/09/94	Peoria BassMasters	Wesley Rd., E. Peoria	6	6	1	0.17	2.38	2.38
08/07/94	Rivercity Casters	Pekin Boat Club	20	20	28	1.40	44.70	1.60
08/14/94	Scott County Bass Anglers	RF Park, Havana	10	10	27	2.70	42.75	1.58
07/24/94	Springfield Illinois Bass Club	Browning Ramp	9	9	36	4.00	53.50	1.49
		Totals	**1,687**	**1,687**	**3,115**	**1.85**	**5,191.06**	**1.67**

Appendix B. Tournament statistics for La Grange and Peoria Reaches of the Illinois River (1995).

Date	Sponsor	Location	Number Anglers	Angling Days	Number Fish	Fish Per Angler Per Day (F/A/D)	Total Weight	Average Weight
07/09/95	American Scholarship	Pekin Boat Club	42	42	71	1.69	134.90	1.90
05/14/95	American Scholarship	Detweiller Marina	72	72	45	0.63	108.00	2.40
08/06/95	American Scholarship	Havana	40	40	46	1.15	102.00	2.22
06/08/95	BassMasters SuperStars	Civic Center, Peoria	31	31	94	3.03	163.75	1.74
06/09/95	BassMasters SuperStars	Civic Center, Peoria	31	31	81	2.61	144.88	1.79
06/10/95	BassMasters SuperStars	Civic Center, Peoria	31	31	79	2.55	149.69	1.89
08/27/95	Big River Bassers	Browning	20	20	35	1.75	65.00	1.86
08/13/95	BiState Bassers	Browning	18	18	33	1.83	53.38	1.62
07/02/95	Bloomington/Normal Bass Club	Havana	38	38	63	1.66	111.16	1.76
08/19/95	Buell's Open	Havana	94	94	142	1.51	235.51	1.66
07/25/95	Central Ill. Boat Dealer/Tackle Manuf. Open	Pekin Boat Club	114	114	232	2.04	425.35	1.83
07/09/95	Dixie BassMasters	Havana	14	14	6	0.43	11.25	1.88
07/02/95	Fulton County Tournament Association	Havana	62	62	69	1.11	139.97	2.03
08/20/95	Fulton County Tournament Association	Detweiller Marina	14	14	7	0.50	13.13	1.88
07/16/95	Galesburg BassMasters Galesburg BassMasters	Havana	34	34	69	2.03	131.25	1.90
07/16/95	Glasford B.A.S.S.	Browning	22	22	21	0.95	35.47	1.69
09/17/95	Glasford B.A.S.S.	Liverpool	20	20	18	0.90	31.47	1.75
10/15/95	Glasford B.A.S.S.	Havana	18	18	26	1.44	45.43	1.75
06/18/95	Illinois B.A.S.S. Federation	Havana	178	178	119	0.67	234.26	1.97
10/14/95	Illinois B.A.S.S. Federation	Detweiller Marina						
10/15/95	Illinois B.A.S.S. Federation	Detweiller Marina	100	200	96	0.48	172.80	1.80
07/09/95	Illinois Central B.A.S.S.	Detweiller Marina	25	25	42	1.68	76.12	1.81
07/30/95	Illinois Central B.A.S.S.	Havana	35	35	72	2.06	128.38	1.78
08/20/95	Illinois Central B.A.S.S.	Havana	20	20	25	1.25	50.00	2.00
07/29/95	Illinois Central Military Bass Anglers	Havana	9	9	17	1.89	31.18	1.83
08/12/95	Illinois Central Military Bass Anglers	Havana	9	18	20	1.11	36.64	1.83
08/13/95	Illinois Central Military Bass Anglers	Havana						
06/17/95	Illinois Central Military Bass Anglers	Pekin	9	9	3	0.33	4.00	1.33
07/12/95	Illinois Lunker Hunters	Lacon	39	39	17	0.44	29.00	1.71
10/07/95	Illinois Lunker Hunters	Havana	11	11	2	0.18	6.50	3.25
07/09/95	Jacksonville Bass Club	Bath	12	12	18	1.50	32.40	1.80
06/24/95	Lunkers Unlimited	Havana	21	21	46	2.19	83.29	1.81
06/25/95	Lunkers Unlimited	Havana	21	21	53	2.52	95.97	1.81
10/14/95	Lunkers Unlimited	Havana	32	32	12	0.38	23.18	1.93
10/15/95	Lunkers Unlimited	Havana	32	32	29	0.91	56.01	1.93
06/18/95	Monocoeur	Lacon and Havana	20	20	20	1.00	35.00	1.75
05/07/95	Midwest Bass Association	Detweiller Marina	24	24	16	0.67	30.86	1.93
06/24/95	Midwest Bass Association	Pekin Boat Club	32	32	47	1.47	87.43	1.86
09/24/95	Midwest Bass Association	Havana	23	23	30	1.30	65.85	2.20
08/13/95	Midwest Bass Association	Havana	22	22	42	1.91	79.99	1.90
09/10/95	Midwest Bass Association	Pekin Boat Club	28	28	21	0.75	42.11	2.01
07/08/95	Northern Illinois BassMasters	Havana	20	20	12	0.60	21.42	1.79
07/09/95	Northern Illinois BassMasters	Havana	20	20	18	0.90	35.16	1.95
07/30/95	Northland Invitational	Pekin	36	36	32	0.89	57.60	1.80
08/27/95	Rivercity Casters	Pekin	12	12	19	1.58	29.13	1.53
08/26/95	Springfield Illinois Bass Club	Browning	12	12	15	1.25	24.10	1.61
07/08/95	Starved Rock BassMasters	Havana	14	14	14	1.00	28.09	2.01
07/09/95	Starved Rock BassMasters	Havana	14	14	20	1.43	35.13	1.76
07/09/95	Three Rivers Bass Team	Havana	14	14	20	1.43	37.30	1.87
07/30/95	U.S. Fishing Association	Havana	8	8	7	0.88	17.02	2.43
		Totals	**1,567**	**1,676**	**2,041**	**1.22**	**3,787.51**	**1.86**

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6. AUTHOR(S)

Paul T. Raibley[1], Timothy M. O'Hara[1], Kevin S. Irons[1], K. Douglas Blodgett[1], and Richard E. Sparks[2]

7. PERFORMING ORGANIZATION NAME AND ADDRESS

[1]Illinois Natural History Survey, LTRMP La Grange Field Station, 704 N. Schrader Avenue, Havana, Illinois 62644
[2]Illinois Natural History Survey, Forbes Biological Station, P.O. Box 590, Havana, Illinois 62644

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13. ABSTRACT (Maximum 200 words)

Largemouth bass (*Micropterus salmoides*) are an important component of the recreational and tournament fisheries in the Illinois River. From 1992 through 1994, we tagged and released 4,507 largemouth bass. Through 1995, 652 different anglers caught and reported 1,162 (24.9%) tagged largemouth bass. Including those we recaptured, of 1,473 largemouth bass for which we had the location of recapture, 985 (66.9%) were recaptured within 1 mile (1.6 km) of their release location, indicating tagged largemouth bass usually stayed in the area they were released. Fish released along the main channel were more likely to move than those released in backwaters or sloughs, and largemouth bass translocated by tournament anglers and released by us were more likely to move than those released in their home areas after electrofishing sampling.

During a 5-day intensive sampling, we calculated a population estimate of 1,684 largemouth bass in a 2.5-mile (4-km) stretch of a backwater slough; largemouth bass densities were comparable to those documented on Mississippi River backwaters in the late 1980s when fishing there was considered high quality.

We documented 106 tournaments on the La Grange and Peoria Reaches from 1992 to 1995, where anglers brought in 6,793 largemouth bass weighing 11,544 pounds (5,247 kg) with an average weight of 1.7 pounds (0.8 kg).

Perhaps the most effective strategy for managing Illinois River largemouth bass populations is to preserve and enhance spawning, nursery, and wintering habitats.

14. SUBJECT TERMS

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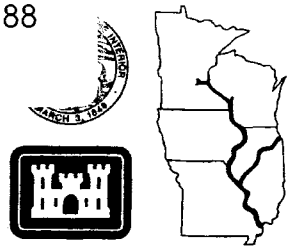

Long Term Resource Monitoring Program

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Mark and Recapture Studies and Angling Impacts on Largemouth Bass in La Grange and Peoria Reaches of the Illinois River

May 1998

Mark and Recapture Studies and Angling Impacts on Largemouth Bass in La Grange and Peoria Reaches of the Illinois River

by

Paul T. Raibley[1], Timothy M. O'Hara[1], Kevin S. Irons[1], K. Douglas Blodgett[1], and Richard E. Sparks[2]

[1]Illinois Natural History Survey, LTRMP La Grange Field Station, 704 N. Schrader Avenue, Havana, Illinois 62644

[2]Illinois Natural History Survey, Forbes Biological Station, P.O. Box 590, Havana, Illinois 62644

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Preface

This reprint originally appeared in *Center for Aquatic Ecology, Illinois Natural History Survey,* and is being provided in this format as a service to Long Term Resource Monitoring Program (LTRMP) partners.

The LTRMP interests in the subject matter of this report are embodied in the LTRMP Operating Plan[1] in Task 1.3.2.4, *Conduct Research*, and Strategy 3.1.3, *Identify Ecologically Realistic Levels for Future Consumptive Use.* This research was supported by the U.S. Army Corps of Engineers and the National Biological Service through the Upper Mississippi River System Long Term Resource Monitoring Program and by the Illinois Department of Natural Resources.

The LTRMP is being implemented by the Environmental Management Technical Center, a U.S. Geological Survey science center, in cooperation with the five Upper Mississippi River System (UMRS) States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The U.S. Army Corps of Engineers provides guidance and has overall Program responsibility. The mode of operation and respective roles of the agencies are outlined in a 1988 Memorandum of Agreement.

The UMRS encompasses the commercially navigable reaches of the Upper Mississippi River, as well as the Illinois River and navigable portions of the Kaskaskia, Black, St. Croix, and Minnesota Rivers. Congress has declared the UMRS to be both a nationally significant ecosystem and a nationally significant commercial navigation system. The mission of the LTRMP is to provide decision makers with information for maintaining the UMRS as a sustainable large river ecosystem given its multiple-use character. The long-term goals of the Program are to understand the system, determine resource trends and effects, develop management alternatives, manage information, and develop useful products.

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[1]U.S. Fish and Wildlife Service. 1993. Operating Plan for the Upper Mississippi River System Long Term Resource Monitoring Program. Environmental Management Technical Center, Onalaska, Wisconsin, Revised September 1993. EMTC 91-P002R. 179 pp. (NTIS #PB94-160199)